

STIC SEARCH REQUEST FOR 10/079,816
CANTELMO 571 272 1283

ADDITIONAL SEARCH INFORMATION:

Claims broadly drawn to a carbon carrier having particles (metal, metal alloy or metal oxide as specified in claim 1 above) formed on the carbon carrier.

Synonyms

Carrier ... base, core, support, substrate

Particles ... grains, granules

Carbon ... graphite, fullerene, nanotube

Particles ... numerous combinations of the materials set forth above
also look for the generic formulas AB_5 , AB , A_2B , AB_2
where A and B are at least 2 of the metal constituents
in the claim.

Also look for PVD, physical vapor (vapour) deposition or sputtering of the metal, metal alloy or metal oxide materials of claim 1 without using the term particles, grains or granules (the process inherently generates particles).

=> file reg

FILE 'REGISTRY' ENTERED AT 16:03:35 ON 03 FEB 2004

USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.

PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

COPYRIGHT (C) 2004 American Chemical Society (ACS)

=> display history full ll-

FILE 'REGISTRY' ENTERED AT 14:12:29 ON 03 FEB 2004

E CARBON/CN
L1 1 SEA CARBON/CN
L2 2285 SEA ?FULLEREN?/CNS AND 1/ELC.SUB
E HYDROGEN/CN
L3 1 SEA HYDROGEN/CN
E VANADIUM/CN
L4 1 SEA VANADIUM/CN
E NIOBIUM/CN
L5 1 SEA NIOBIUM/CN
E TANTALUM/CN
L6 1 SEA TANTALUM/CN
E TITANIUM/CN
L7 1 SEA TITANIUM/CN
E ZIRCONIUM/CN
L8 1 SEA ZIRCONIUM/CN
E HAFNIUM/CN
L9 1 SEA HAFNIUM/CN
E LANTHANUM/CN
L10 1 SEA LANTHANUM/CN
E CERIUM/CN
L11 1 SEA CERIUM/CN

FILE 'LREGISTRY' ENTERED AT 14:21:52 ON 03 FEB 2004

L12 694 SEA ((MG OR TI)/ELS OR LNTH/PG OR (ZR OR V OR CA)/ELS)
(L) (FE OR CO OR NI OR CU OR MN OR MO OR W)/ELS AND
AYS/CI
L13 943 SEA ((MG OR TI)/ELS OR LNTH/PG OR (ZR OR V OR CA OR
AL)/ELS) (L) (FE OR CO OR NI OR CU OR MN OR MO OR W)/ELS
AND AYS/CI

FILE 'REGISTRY' ENTERED AT 14:32:20 ON 03 FEB 2004

L14 358356 SEA ((MG OR TI)/ELS OR LNTH/PG OR (ZR OR V OR CA OR
AL)/ELS) (L) (FE OR CO OR NI OR CU OR MN OR MO OR W)/ELS
AND AYS/CI
L15 177590 SEA L14 NOT AL/ELS
L16 180766 SEA L14 NOT L15
L17 297 SEA (CU(L)O)/ELS (L) 2/ELC.SUB
L18 174 SEA (MN(L)O)/ELS (L) 2/ELC.SUB

L19 107 SEA (SN(L)O)/ELS (L) 2/ELC.SUB
L20 110 SEA (ZN(L)O)/ELS (L) 2/ELC.SUB
L21 522 SEA (V(L)O)/ELS (L) 2/ELC.SUB
L22 373 SEA (TI(L)O)/ELS (L) 2/ELC.SUB
L23 193 SEA (CO(L)O)/ELS (L) 2/ELC.SUB
L24 392 SEA (FE(L)O)/ELS (L) 2/ELC.SUB

FILE 'HCA' ENTERED AT 14:50:59 ON 03 FEB 2004

L25 66665 SEA (L3 OR HYDROGEN# OR H2 OR H) (2A) (STORE# OR STORING#
OR STORAG? OR ABSORB? OR ABSORP? OR ADSORB? OR ADSORP?
OR CHEMICOSORB? OR CHEMICOSORP? OR CHEMISORB? OR
CHEMISORP? OR SORB?)

FILE 'LCA' ENTERED AT 14:51:02 ON 03 FEB 2004

L26 1094 SEA L1 OR L2 OR CARBONACEOUS? OR CARBONIFEROUS? OR
?FULLEREN? OR CARBONBLACK? OR BONEBLACK? OR LAMPBLACK?
OR CHIMNEYBLACK? OR CHANNELBLACK? OR NORIT# OR (ACT# OR
ACTIVAT?) (2A) (CARBON# OR C OR CHARCOAL?) OR BLACK? (2A) (LA
MP? OR CHANNEL? OR CHIMNEY? OR BONE# OR CARBON# OR C)
L27 106 SEA (CARBON# OR C) (2A) (SUPPORT? OR SUBSTRAT? OR BED OR
BEDS OR BEDDED OR BEDDING# OR BASE# OR CARRIER? OR
CORE#)

FILE 'REGISTRY' ENTERED AT 14:58:21 ON 03 FEB 2004

E GRAPHITE/CN
L28 1 SEA GRAPHITE/CN

FILE 'LCA' ENTERED AT 14:58:35 ON 03 FEB 2004

L29 633 SEA L28 OR GRAPHIT? OR NANOTUBE# OR NANOTUBING# OR
NANOTUBUL? OR NANOROD? OR NANO(2A) (TUBE# OR TUBING# OR
TUBUL? OR ROD OR RODS)

FILE 'HCA' ENTERED AT 15:01:08 ON 03 FEB 2004

L30 659156 SEA L26 OR L27 OR L29
L31 78861 SEA L4
L32 59180 SEA L5
L33 46366 SEA L6
L34 141959 SEA L7
L35 63794 SEA L8
L36 20054 SEA L9
L37 43461 SEA L10
L38 47934 SEA L11
L39 148693 SEA L15
L40 213320 SEA L16
L41 1127 SEA ((L17 OR L18 OR L19 OR L20 OR L21 OR L22 OR L23 OR
L24)) (3A) (SEMICOND? OR SEMI(2A) (COND? OR CONDUCT?))
L42 9444 SEA PVD OR (PHYS# OR PHYSICAL?) (3A) (VAPOR? OR VAPOUR?) (3A
)DEPOSIT?

L43 139465 SEA SPUTTER? OR (GLOW? OR ARC OR SPARK?) (2A)DISCHARG?
L44 4961 SEA L25 AND L30
L45 87 SEA L44 AND (L42 OR L43)
L46 0 SEA L45 AND L42
L47 87 SEA L45 AND L43
L48 8 SEA L45 AND ((L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR
L37 OR L38 OR L39 OR L40))
L49 0 SEA L45 AND L41
L50 0 SEA L44 AND L41
L51 433 SEA L44 AND ((L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR
L37 OR L38 OR L39 OR L40))
L52 184 SEA L44 AND ((L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR
L37 OR L38))
L53 284 SEA L44 AND (L39 OR L40)
L54 8 SEA (L52 OR L53) AND (L42 OR L43)
L55 98498 SEA AB5 OR AB OR A2B OR AB2
L56 79 SEA L44 AND L55
L57 3228 SEA AB5 OR A2B OR AB2
L58 23 SEA L44 AND L57

FILE 'LCA' ENTERED AT 15:41:32 ON 03 FEB 2004

L59 5586 SEA (PARTICL? OR MICROPARTICL? OR PARTICULAT? OR DUST?
OR GRIT? OR GRAIN# OR GRANUL? OR POWDER? OR SOOT? OR
SMUT? OR FINES# OR PRILL? OR FLAKE# OR PELLET? OR
BB#)/BI,AB

FILE 'HCA' ENTERED AT 15:48:39 ON 03 FEB 2004

L60 197597 SEA FINES OR NANOPARTICL? OR MICROPARTICL? OR (FINE# OR
SMALL? OR TINY OR LITTLE? OR MINISCUL? OR NANO OR MICRO
OR MICROSCOP?) (2A) (PARTICL? OR PARTICULAT? OR DUST? OR
GRIT? OR GRAIN## OR POWDER?)
L61 123 SEA L44 AND L60
L62 6 SEA L61 AND (L42 OR L43)
L63 7 SEA L61 AND ((L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR
L37 OR L38))
L64 10 SEA L61 AND (L39 OR L40)
L65 0 SEA L61 AND L41

FILE 'LCA' ENTERED AT 15:57:54 ON 03 FEB 2004

L66 22 SEA (FINE# OR SMALL? OR TINY OR LITTLE? OR MINISCUL? OR
NANO OR MICRO OR MICROSCOP?) (2A)GRANUL?

FILE 'HCA' ENTERED AT 16:00:18 ON 03 FEB 2004

L67 7228 SEA (FINE# OR SMALL? OR TINY OR LITTLE? OR MINISCUL? OR
NANO OR MICRO OR MICROSCOP?) (2A)GRANUL?
L68 1 SEA L44 AND L67
L69 28 SEA L48 OR L54 OR L62 OR L63 OR L64 OR L68
L70 23 SEA L58 NOT L69

=> file hca

FILE 'HCA' ENTERED AT 16:03:54 ON 03 FEB 2004

USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.

PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

COPYRIGHT (C) 2004 AMERICAN CHEMICAL SOCIETY (ACS)

=> d 169 1-28 cbib abs hitstr hitind

L69 ANSWER 1 OF 28 HCA COPYRIGHT 2004 ACS on STN

139:151782 Method for producing hydrogen occlusion material. Tsuboi, Toshiyuki (Futaba Corporation, Japan). U.S. US 6602485 B1 20030805, 5 pp. (English). CODEN: USXXAM. APPLICATION: US 2000-619651 20000719.

AB A hydrogen occlusion material producing method capable of producing a hydrogen occlusion material during prepn. of a **carbonaceous** material such as carbon **nanotubes** or the like. A gas atm. at a predetd. pressure is formed in a chamber and then a DC current is fed to a pair of carbon electrodes from a discharge power unit while keeping the carbon electrodes spaced from each other at a predetd. interval through a pair of position control units, leading to **arc discharge**. This results in an anode constituted by platinum metal which exhibits both a catalytic function during prepn. of carbon **nanotubes** and a function of dissocg. hydrogen mols. into hydrogen atoms being heated, to thereby produce soot. The soot contains a large amt. of hydrogen occlusion material wherein **fine particles** of the platinum metal are uniformly adhered to single-layer carbon **nanotubes**, resulting in being used for a hydrogen occlusion material.

IT 7439-91-0, Lanthanum, uses 7440-45-1, Cerium, uses (method for producing hydrogen occlusion material from **carbonaceous** materials such as carbon **nanotubes** or **fullerene**)

RN 7439-91-0 HCA

CN Lanthanum (8CI, 9CI) (CA INDEX NAME)

La

RN 7440-45-1 HCA

CN Cerium (8CI, 9CI) (CA INDEX NAME)

Ce

IC ICM C01B031-02
NCL 423445000R; 423445000B; 423447100
CC 49-1 (Industrial Inorganic Chemicals)
ST hydrogen occlusion material carbon **nanotube**
fullerene
IT Electrodes
 Nanotubes
 (carbon; method for producing hydrogen occlusion material from
 carbonaceous materials such as carbon **nanotubes**
 or **fullerene**)
IT **Absorbents**
 (hydrogen occlusion material; method for producing
 hydrogen occlusion material from **carbonaceous** materials
 such as carbon **nanotubes** or **fullerene**)
IT Electric arc
 (method for producing hydrogen occlusion material from
 carbonaceous materials such as carbon **nanotubes**
 or **fullerene**)
IT **Carbonaceous** materials (technological products)
 Fullerenes
 (method for producing hydrogen occlusion material from
 carbonaceous materials such as carbon **nanotubes**
 or **fullerene**)
IT Anodes
 (platinum; method for producing hydrogen occlusion material from
 carbonaceous materials such as carbon **nanotubes**
 or **fullerene**)
IT Iridium alloy, base
 Osmium alloy, base
 (method for producing hydrogen occlusion material from
 carbonaceous materials such as carbon **nanotubes**
 or **fullerene**)
IT 7429-91-6, Dysprosium, uses 7439-89-6, Iron, uses
 7439-91-0, Lanthanum, uses 7439-94-3, Lutetium, uses
 7440-00-8, Neodymium, uses 7440-02-0, Nickel, uses 7440-06-4,
 Platinum, uses 7440-10-0, Praseodymium, uses 7440-18-8,
 Ruthenium, uses 7440-27-9, Terbium, uses **7440-45-1**,
 Cerium, uses 7440-48-4, Cobalt, uses 7440-52-0, Erbium, uses
 7440-54-2, Gadolinium, uses 7440-60-0, Holmium, uses 7440-65-5,
 Yttrium, uses
 (method for producing hydrogen occlusion material from
 carbonaceous materials such as carbon **nanotubes**
 or **fullerene**)
IT 7440-05-3, Palladium, uses 7440-16-6, Rhodium, uses
 (method for producing hydrogen occlusion material from
 carbonaceous materials such as carbon **nanotubes**
 or **fullerene**)
IT 1333-74-0, Hydrogen, processes

(method for producing hydrogen occlusion material from
carbonaceous materials such as carbon **nanotubes**
or **fullerene**)

IT 1314-08-5, Palladium oxide 7439-88-5, Iridium, uses 7440-04-2,
Osmium, uses 12030-49-8, Iridium oxide 12680-36-3, Rhodium oxide
20816-12-0, Osmium oxide
(method for producing hydrogen occlusion material from
carbonaceous materials such as carbon **nanotubes**
or **fullerene**)

L69 ANSWER 2 OF 28 HCA COPYRIGHT 2004 ACS on STN

139:142660 Synthesis, argon/**hydrogen storage** and
magnetic properties of boron nitride **nanotubes** and
nanocapsules. Oku, Takeo; Kuno, Masaki (Institute of Scientific and
Industrial Research, Osaka University, Ibaraki, Osaka, 567-0047,
Japan). Diamond and Related Materials, 12(3-7), 840-845 (English)
2003. CODEN: DRMTE3. ISSN: 0925-9635. Publisher: Elsevier Science
B.V..

AB BN **fullerene** materials such as **nanotubes**,
nanocapsules and nanocages were synthesized from LaB₆, Co, Pd, Ti,
Ni or Cu catalyst with boron powder by using an arc-melting method
under an Ar-N atm.. For the BN nanocapsules with Co and CoOx
nanoparticles, argon was detected by energy dispersive x-ray
spectroscopy, and the nanocapsules had superparamagnetic properties.
Thermogravimetry/differential thermogravimetric anal. of BN
nanomaterials produced from LaB₆ and Pd/boron powder showed the
possibility of **hydrogen storage** of .apprx.3
wt.%.

IT 7440-32-6, Titanium, processes
(in arc synthesis, argon/**hydrogen storage** and
magnetic properties of boron nitride **nanotubes** and
nanocapsules)

RN 7440-32-6 HCA

CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

CC 78-5 (Inorganic Chemicals and Reactions)

ST boron nitride **nanotube** nanocapsule synthesis property use

IT Magnetism

Nanostructures

Nanotubes

(arc synthesis, argon/**hydrogen storage** and
magnetic properties of boron nitride **nanotubes** and
nanocapsules)

IT Catalysts

(in arc synthesis, argon/**hydrogen storage** and

- magnetic properties of boron nitride **nanotubes** and nanocapsules)
- IT 1333-74-0, Hydrogen, processes 7440-37-1, Argon, processes (arc synthesis, argon/**hydrogen storage** and magnetic properties of boron nitride **nanotubes** and nanocapsules)
- IT 7440-02-0, Nickel, processes 7440-05-3, Palladium, processes **7440-32-6**, Titanium, processes 7440-42-8, Boron, processes 7440-48-4, Cobalt, processes 7440-50-8, Copper, processes 7727-37-9, Nitrogen, processes 11104-61-3, Cobalt oxide 12008-21-8, Lanthanum boride lab6 (in arc synthesis, argon/**hydrogen storage** and magnetic properties of boron nitride **nanotubes** and nanocapsules)
- L69 ANSWER 3 OF 28 HCA COPYRIGHT 2004 ACS on STN
- 139:27686 Suppression of **hydrogen absorption** to V-4Cr-4Ti alloy by TiO₂/TiC coating. Hirohata, Y.; Motojima, D.; Hino, T.; Sengoku, S. (Department of Nuclear Engineering, Hokkaido University, Kita-13,, Nishi-8, Kita-ku, Sapporo, 060-8628, Japan). Journal of Nuclear Materials, 313-316, 172-176 (English) 2003. CODEN: JNUMAM. ISSN: 0022-3115. Publisher: Elsevier Science B.V..
- AB Ti oxide film was coated on the surface of a V-4Cr-4Ti alloy to reduce **H absorption** at low temp. region. Ti oxide was deposited by radiofrequency reactive magnetron **sputtering** with a Ti target using O as **sputter** gas. The film consisted of a mixt. of TiO₂ and TiC. The content of TiO₂ was .apprx.80%. The at. compn. remained the same in the temp. range <873 K. The film thickness also remained the same in the temp. region <773 K. At the temp. >973 K, the O concn. decreased due to diffusion into the bulk of V-alloy, and the C concn. increased due to diffusion from the bulk of V-alloy. The **H absorption** rate of Ti-oxide coated V-alloy decreased with increase of the film thickness. In the case of the film with the thickness of 0.5 .mu.m, the absorption rate was much smaller than that of noncoated V-alloy at the absorption temp. of 573 K. Information is applicable to embrittlement of fusion reactor materials.
- IT **7440-32-6**, Titanium, processes **7440-44-0**, Carbon, processes **7440-62-2**, Vanadium, processes (in study of **hydrogen absorption** to vanadium alloy)
- RN 7440-32-6 HCA
- CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

RN 7440-62-2 HCA
CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

CC 71-2 (Nuclear Technology)
Section cross-reference(s): 56
ST **hydrogen absorption** fusion reactor embrittlement
vanadium alloy
IT Embrittlement
(**hydrogen absorption** to vanadium alloy in
relation to)
IT Diffusion
(in relation to **hydrogen absorption** to
vanadium alloy)
IT Heat treatment
(in study of **hydrogen absorption** to vanadium
alloy)
IT **Absorption**
(suppression of **hydrogen absorption** to
vanadium alloy by TiO2/TiC coating)
IT Fusion reactors
(suppression of **hydrogen absorption** to
vanadium alloy by TiO2/TiC coating for application to)
IT Magnetron **sputtering**
(suppression of **hydrogen absorption** to
vanadium alloy by TiO2/TiC coating using)
IT **7440-32-6**, Titanium, processes **7440-44-0**, Carbon,
processes **7440-62-2**, Vanadium, processes 7727-37-9,
Nitrogen, processes 7782-44-7, Oxygen, processes
(in study of **hydrogen absorption** to vanadium
alloy)
IT 220103-18-4, NIFS HEAT 1
(suppression of **hydrogen absorption** to
vanadium alloy)
IT 12070-08-5, Titanium carbide (TiC) 13463-67-7, Titanium oxide
(TiO2), uses
(suppression of **hydrogen absorption** to
vanadium alloy by TiO2/TiC coating)
IT 1333-74-0, Hydrogen, processes
(suppression of **hydrogen absorption** to

vanadium alloy by TiO₂/TiC coating)

L69 ANSWER 4 OF 28 HCA COPYRIGHT 2004 ACS on STN

138:371658 **Hydrogen storage** in carbon nanostructures. Tarasov, Boris P.; Shul'ga, Yuriy M.; Lobodyuk, Oleksander O.; Onipko, Oleksiy (Institute of Problems of Chemical Physics, RAS, Chernogolovka, Russia). Proceedings of SPIE-The International Society for Optical Engineering, 4806(Complex Mediums III: Beyond Linear Isotropic Dielectrics), 197-206 (English) 2002. CODEN: PSISDG. ISSN: 0277-786X. Publisher: SPIE-The International Society for Optical Engineering.

AB Magnetization curves in the fields .ltoreq.10 kOe measured for powders produced by elec. arc **sputtering** at **graphite**-Co-Ni electrodes. It was ascertained that magnetic properties of powders essentially depend on the place of their deposition within a spray chamber. The deposition growing on the cathode is basically a diamagnetic material while the rest of the products after **sputtering** is ferromagnetic. Their ferromagnetism is conditioned by Co-Ni **nanoparticles**. Some of them are encapsulated into the carbon shell that preserves those particles from oxidn. by air and dissoln. in HCl.

IT **7782-42-5, Graphite, processes**
(**H2 storage** in C nanostructured powders obtained by **sputtering** using **graphite**-Co-Ni electrodes)

RN 7782-42-5 HCA

CN Graphite (8CI, 9CI) (CA INDEX NAME)

C

IT **7440-44-0, Carbon, uses**
(**H2 storage** in C nanostructured powders obtained by **sputtering** using **graphite**-Co-Ni electrodes)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 77

ST carbon nanopowder **graphite** cobalt nickel
sputtering hydrogen storage

IT Electrodes
Energy **storage**
Nanostructures

Sputtering

(H2 storage in C nanostructured powders obtained by **sputtering** using **graphite-Co-Ni** electrodes)

IT Coercive force (magnetic)

Magnetization

(H2 storage in C nanostructured powders obtained by **sputtering** using **graphite-Co-Ni** electrodes and characterized via)

IT 7440-02-0, Nickel, processes 7440-48-4, Cobalt, processes

7782-42-5, Graphite, processes 11101-13-6

(H2 storage in C nanostructured powders obtained by **sputtering** using **graphite-Co-Ni** electrodes)

IT 7440-44-0, Carbon, uses

(H2 storage in C nanostructured powders obtained by **sputtering** using **graphite-Co-Ni** electrodes)

IT 1333-74-0, Hydrogen, uses

(H2 storage in C nanostructured powders obtained by **sputtering** using **graphite-Co-Ni** electrodes)

L69 ANSWER 5 OF 28 HCA COPYRIGHT 2004 ACS on STN

138:174581 **Core-shell carbon** nanofiber materials for **hydrogen storage** and their preparation. Huang, Houjin; Ata, Masafumi; Yamada, Atsuo; Tsutsui, Shigemitsu (Sony Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2003054901 A2 20030226, 36 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2001-245479 20010813.

AB The title materials consist of a slit-pore carbon nanofiber having **graphite** planes disposed parallel to one another around a central hole, with the **hydrogen stored** in between the **graphite** planes and the central hole contg. **hydrogen storage** materials of 10-90 vol.% content or those showing higher (vol.%) **H storage** capacity. The materials are manufd. by generation of **arc discharge** between a bowl-shaped **graphite** cathode and a C-contg. anode in presence of and 10-90 wt.% (**based** on C-contg. materials in anode and catalysts) catalyst selected from Li, Ni, Mg, Al, Ti, V, Nb, Ga, In, Fe, Ir, Rh, Ru, Pt, Se, Sc, Y, La, Ce, Pr, Nd, Gd, Mi-La, Mg-Ni, Mg-Ce, Ca-Ni, Na-Al, Ni-Ce, and Ti-Fe-C and optionally in presence of source gases, e.g. CO, CH4, CH2CH2. Lightwt. and safe **H-absorbing** materials are manufd. easily at low cost.

IT 7782-42-5, Graphite, uses

(cathode; manuf. of **core-shell carbon** nanofiber materials for **hydrogen storage** by

arc discharging of graphite cathode
bowls in presence of catalysts)

RN 7782-42-5 HCA
CN Graphite (8CI, 9CI) (CA INDEX NAME)

C

IT 7439-91-0, Lanthanum, uses 7440-03-1, Niobium,
uses 7440-32-6, Titanium, uses 7440-44-0,
Carbon, uses 7440-45-1, Cerium, uses 7440-62-2,
Vanadium, uses 12683-37-3 54259-32-4
55502-00-6 56944-09-3

(manuf. of **core-shell carbon** nanofiber
materials for **hydrogen storage** by **arc**
discharging of graphite cathode bowls in
presence of catalysts)

RN 7439-91-0 HCA
CN Lanthanum (8CI, 9CI) (CA INDEX NAME)

La

RN 7440-03-1 HCA
CN Niobium (8CI, 9CI) (CA INDEX NAME)

Nb

RN 7440-32-6 HCA
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

RN 7440-45-1 HCA
CN Cerium (8CI, 9CI) (CA INDEX NAME)

Ce

RN 7440-62-2 HCA

CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

RN 12683-37-3 HCA

CN Magnesium alloy, nonbase, Mg,Ni (9CI) (CA INDEX NAME)

Component	Component Registry Number
-----------	------------------------------

=====+=====

Mg	7439-95-4
----	-----------

Ni	7440-02-0
----	-----------

RN 54259-32-4 HCA

CN Cerium alloy, nonbase, Ce,Ni (9CI) (CA INDEX NAME)

Component	Component Registry Number
-----------	------------------------------

=====+=====

Ce	7440-45-1
----	-----------

Ni	7440-02-0
----	-----------

RN 55502-00-6 HCA

CN Carbon alloy, nonbase, C,Fe,Ti (9CI) (CA INDEX NAME)

Component	Component Registry Number
-----------	------------------------------

=====+=====

C	7440-44-0
---	-----------

Fe	7439-89-6
----	-----------

Ti	7440-32-6
----	-----------

RN 56944-09-3 HCA

CN Calcium alloy, nonbase, Ca,Ni (9CI) (CA INDEX NAME)

Component	Component Registry Number
-----------	------------------------------

=====+=====

Ca	7440-70-2
----	-----------

Ni	7440-02-0
----	-----------

IC ICM C01B003-00

ICS B01J020-20; B82B001-00; B82B003-00; C01B031-02; D01F009-127

CC 57-8 (Ceramics)

Section cross-reference(s): 49, 52

ST **hydrogen absorbing core** shell

carbon nanofiber; **arc discharge** manuf

- slit pore carbon nanofiber
- IT Nanofibers
 (carbon, slit-pore type; manuf. of **core-shell carbon nanofiber materials for hydrogen storage by arc discharging** of **graphite** cathode bowls in presence of catalysts)
- IT Electric arc
 (manuf. of **core-shell carbon nanofiber materials for hydrogen storage by arc discharging** of **graphite** cathode bowls in presence of catalysts)
- IT Carbon fibers, preparation
 (nano-, slit-pore type; manuf. of **core-shell carbon nanofiber materials for hydrogen storage by arc discharging** of **graphite** cathode bowls in presence of catalysts)
- IT 7782-42-5, Graphite, uses
 (cathode; manuf. of **core-shell carbon nanofiber materials for hydrogen storage by arc discharging** of **graphite** cathode bowls in presence of catalysts)
- IT 7429-90-5, Aluminum, uses 7439-88-5, Iridium, uses 7439-89-6, Iron, uses 7439-91-0, Lanthanum, uses 7439-92-1, Lead, uses 7439-93-2, Lithium, uses 7439-95-4, Magnesium, uses 7439-98-7, Molybdenum, uses 7440-00-8, Neodymium, uses 7440-02-0, Nickel, uses 7440-03-1, Niobium, uses 7440-06-4, Platinum, uses 7440-10-0, Praseodymium, uses 7440-16-6, Rhodium, uses 7440-18-8, Ruthenium, uses 7440-20-2, Scandium, uses 7440-31-5, Tin, uses 7440-32-6, Titanium, uses 7440-42-8, Boron, uses 7440-44-0, Carbon, uses 7440-45-1, Cerium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses 7440-54-2, Gadolinium, uses 7440-55-3, Gallium, uses 7440-56-4, Germanium, uses 7440-62-2, Vanadium, uses 7440-65-5, Yttrium, uses 7440-66-6, Zinc, uses 7440-74-6, Indium, uses 7782-49-2, Selenium, uses 8049-20-5, Misch metal 12683-37-3 54259-32-4 55502-00-6 56944-09-3 103256-65-1 107529-34-0
 (manuf. of **core-shell carbon nanofiber materials for hydrogen storage by arc discharging** of **graphite** cathode bowls in presence of catalysts)
- IT 1333-74-0, Hydrogen, miscellaneous
 (manuf. of **core-shell carbon nanofiber materials for hydrogen storage by arc discharging** of **graphite** cathode bowls in presence of catalysts)
- IT 74-82-8, Methane, reactions 74-85-1, Ethene, reactions 630-08-0, Carbon monoxide, reactions

(manuf. of **core-shell carbon** nanofiber materials for **hydrogen storage** by **arc discharging** of **graphite** cathode bowls in presence of catalysts)

L69 ANSWER 6 OF 28 HCA COPYRIGHT 2004 ACS on STN

138:41667 Carbon **nanotube** production by a cracking of liquid hydrocarbons. Ryzhkov, Vladislav A. (Research and Development Director, Rosseter Holdings Ltd, Limassol, 3310, Cyprus). Physica B: Condensed Matter (Amsterdam, Netherlands), 323(1-4), 324-326 (English) 2002. CODEN: PHYBE3. ISSN: 0921-4526. Publisher: Elsevier Science B.V..

AB Carbon **nanotube** products (MWNTs, SWNTs, SWNHs, and polyhedral **nanoparticles**) are derived from **carbonaceous** deposits formed by a cracking of liq. hydrocarbons, driven by a self-regulated low-voltage a.c./d.c. contact **arc discharge** and/or a resistive heating. A unique geometry of the electrode system allows a continuous prodn. of the dense deposits with a yield of 1-3 g/min and specific consumption of elec. energy of 25-50 kW-h/kg of the deposit.

IT 1333-74-0, Hydrogen, processes
(**absorption** by carbon **nanoparticles**; carbon **nanotube** prodn. by a cracking of liq. hydrocarbons)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H-H

CC 51-11 (Fossil Fuels, Derivatives, and Related Products)

ST carbon **nanotube** hydrocarbon **arc discharge** resistive heating cracking **nanoparticle**

IT Electric arc
Electric heating
Electron emission
Petroleum cracking
(carbon **nanotube** prodn. by a cracking of liq. hydrocarbons)

IT **Nanotubes**
(carbon, multi- and single-walled; carbon **nanotube** prodn. by a cracking of liq. hydrocarbons)

IT Hydrocarbons, processes
(liq.; carbon **nanotube** prodn. by a cracking of liq. hydrocarbons)

IT **Nanoparticles**
(single-walled carbon nanohorns and polyhedrals; carbon **nanotube** prodn. by a cracking of liq. hydrocarbons)

- IT 1333-74-0, Hydrogen, processes
(absorption by carbon **nanoparticles**; carbon
nanotube prodn. by a cracking of liq. hydrocarbons)
- IT 74-86-2P, Acetylene, preparation
(carbon **nanotube** prodn. by a cracking of liq.
hydrocarbons)
- IT 67-64-1, Acetone, processes 71-43-2, Benzene, processes 76-22-2,
Camphor 108-88-3, Toluene, processes 110-54-3, Hexane, processes
110-82-7, Cyclohexane, processes
(starting material; carbon **nanotube** prodn. by a
cracking of liq. hydrocarbons)

L69 ANSWER 7 OF 28 HCA COPYRIGHT 2004 ACS on STN

137:387054 Synthesis and protium absorbing properties of vapor grown
carbon nanofibers grown by Fe-based catalyst. Kudo, Hidehiro; Unno,
Ken; Kamegawa, Atsunori; Takamura, Hitoshi; Okada, Masuo (Department
of Materials Science, Graduate school of Engineering, Tohoku
University, Sendai, 980-8579, Japan). Materials Transactions,
43(5), 1127-1132 (English) 2002. CODEN: MTARCE. ISSN: 1345-9678.
Publisher: Japan Institute of Metals.

AB Vapor grown carbon nano-fibers (VGCFs) were synthesized by using Fe
ingots, Fe powders, nanocryst. Fe₉₁Zr₇B₂ and Fe₇₅Si₁₅B₁₀ alloy
catalysts with **fine bcc-Fe grains** (.apprx.20
nm). The Fe particles worked as catalysts were formed by fracturing
original Fe ingots, Fe powders, and nanocryst. alloys before the
formation of VGCFs. TEM and HREM observations indicated that VGCFs'
structures turned out to be platelet type grown from Fe powders and
Fe₉₁Zr₇B₂, and the tubular type grown from nanocryst. Fe₇₅Si₁₅B₁₀
alloy. In addn. to these structures, VGCFs grown from Fe ingots
exhibited herringbone and coil type structures. Diam. of VGCFs
prepd. from nanocryst. Fe₇₅Si₁₅B₁₀ alloy was smaller than that of
grown from Fe₉₁Zr₇B₂ alloy. This could be originated from the
difference of fracturing process between nanocryst. Fe₉₁Zr₇B₂ and
Fe₇₅Si₁₅B₁₀ alloys. Protium absorbing properties of VGCFs were
evaluated by a Siverts-type app. and electrochem. method. It turned
out that VGCFs had little protium absorbing capacity.

- IT 1333-74-0, Hydrogen, processes
(**storage**; synthesis and protium absorbing properties of
vapor grown carbon nanofibers grown by Fe-based catalyst)
- RN 1333-74-0 HCA
- CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H-H

- IT 131735-29-0
(synthesis and protium absorbing properties of vapor grown carbon
nanofibers grown by Fe-based catalyst)

RN 131735-29-0 HCA
 CN Iron alloy, base, Fe 89,Zr 11,B 0.4 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
=====+=====+=====		
Fe	89	7439-89-6
Zr	11	7440-67-7
B	0.4	7440-42-8

IT 7440-44-0, Carbon, processes
 (synthesis and protium absorbing properties of vapor grown carbon
 nanofibers grown by Fe-based catalyst)
 RN 7440-44-0 HCA
 CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST carbon nanofibers **hydrogen storage**
 IT **Storage**

(of **hydrogen**; synthesis and protium absorbing
 properties of vapor grown carbon nanofibers grown by Fe-based
 catalyst)

IT 1333-74-0, **Hydrogen**, processes
 (**storage**; synthesis and protium absorbing properties of
 vapor grown carbon nanofibers grown by Fe-based catalyst)

IT 64068-92-4 131735-29-0
 (synthesis and protium absorbing properties of vapor grown carbon
 nanofibers grown by Fe-based catalyst)

IT 7440-44-0, Carbon, processes
 (synthesis and protium absorbing properties of vapor grown carbon
 nanofibers grown by Fe-based catalyst)

L69 ANSWER 8 OF 28 HCA COPYRIGHT 2004 ACS on STN

137:327473 Purification of carbon filaments and their use for

storing hydrogen. Pradhan, Bhabendra K.;

Harutyunyan, Avetik; Eklund, Peter C.; Fujiwara, Yoshiya; Goto,

Hajime (The Penn State Research Foundation, USA; Honda Giken Kogyo

Kabushiki Kaisha; Honda Motor Co., Ltd.). PCT Int. Appl. WO

2002083556 A2 20021024, 30 pp. DESIGNATED STATES: W: AE, AG, AL,

AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ,

DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL,

IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,

MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG,

SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM,

ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG,

CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2.

APPLICATION: WO 2002-US11617 20020412. PRIORITY: US 2001-PV283470 20010412; US 2001-PV324066 20010924.

AB A single-wall carbon **nanotube** contg. carbon soot with amorphous carbon and metals as impurities is purified to obtain single a product suitable for the **storage** of **hydrogen** at low temp. The soot prepd. by **arc-discharge** is heated in the presence of air at 220-1000.degree.C for at least 30 min to selectively oxidize carbon impurities. The soot is then refluxed in hydrochloric acid or nitric acid to remove metal impurities derived from catalysts, such as nickel or titanium. The nano-structured carbon is washed, dried, and heated at 650.degree.C under vacuum to remove functional groups on the carbon surface. The purified product can store about 6.5 wt.% of H₂ at 77 K and at < 2 atm. and can be potentially used for fuel cells.

IT **7440-44-0P**, Carbon, uses
(cryst. and amorphous; purifn. of carbon filaments and their use for **storing hydrogen**)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IT **7440-32-6**, Titanium, uses
(purifn. of carbon filaments and their use for **storing hydrogen**)

RN 7440-32-6 HCA

CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

IC ICM C01B031-00

CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49

ST single wall carbon **nanotube** purifn **hydrogen storage** fuel cell

IT **Nanotubes**
(carbon fibers; purifn. of carbon filaments and their use for **storing hydrogen**)

IT Carbon fibers, uses
(**nanotube**; purifn. of carbon filaments and their use for **storing hydrogen**)

IT Electric arc
Fuel cells

Soot

(purifn. of carbon filaments and their use for **storing hydrogen**)

IT Metals, uses

(purifn. of carbon filaments and their use for **storing hydrogen**)

IT 7440-44-0P, Carbon, uses

(cryst. and amorphous; purifn. of carbon filaments and their use for **storing hydrogen**)

IT 7440-02-0, Nickel, uses 7440-32-6, Titanium, uses

(purifn. of carbon filaments and their use for **storing hydrogen**)

IT 1333-74-0, Hydrogen, uses

(purifn. of carbon filaments and their use for **storing hydrogen**)

IT 7647-01-0, Hydrochloric acid, reactions 7697-37-2, Nitric acid, reactions 7722-84-1, Hydrogen peroxide, reactions

(purifn. of carbon filaments and their use for **storing hydrogen**)

L69 ANSWER 9 OF 28 HCA COPYRIGHT 2004 ACS on STN

137:297417 **Hydrogen-storage** material for use in fuel

cell powered vehicles. Goto, Hajime; Furuta, Terumi; Tokune, Toshio; Fujiwara, Yoshiya (Japan). U.S. Pat. Appl. Publ. US 2002146624 A1 20021010, 15 pp. (English). CODEN: USXXCO. APPLICATION: US 2002-79816 20020222. PRIORITY: JP 2001-49327 20010223; JP 2001-342124 20011107.

AB A **hydrogen-storage** material includes a plurality

of **carbon carriers** made of a carbon material having an elec. cond., and a plurality of **fine particles** carried on each of the **carbon carriers** and having a **hydrogen-adsorbing**

ability. The amt. A of **fine particles** carried is in a range of 0.1% by wt. to req. A. to req. 20% by wt. The **fine particles** are at least one selected from **fine particles** of a metal, **fine**

particles of an alloy and **fine particles**

of an oxide semiconductor. For example, the alloy corresponds to an alloy made of at least one selected from the group consisting of Mg, Ti, a rare earth element, Zr, V, Ca and Al, and at least one selected from the group consisting of Fe, Co, Ni, Cu, Mn, Mo and W. Thus, the **hydrogen-storage** material is relatively light; has a high **hydrogen-storing** ability at ambient temp. and under a lower hydrogen pressure; and moreover, exhibits **hydrogen-absorbing/releasing** rates.

IT 7440-44-0, Activated carbon, uses

(activated; **hydrogen-storage**

INSTANT
APPLICATION

material for use in fuel cell powered vehicles)

RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IT 7439-91-0, Lanthanum, uses 7440-03-1, Niobium,
uses 7440-25-7, Tantalum, uses 7440-32-6,
Titanium, uses 7440-45-1, Cerium, uses 7440-58-6
, Hafnium, uses 7440-62-2, Vanadium, uses
7440-67-7, Zirconium, uses
(hydrogen-storage material for use in fuel
cell powered vehicles)

RN 7439-91-0 HCA
CN Lanthanum (8CI, 9CI) (CA INDEX NAME)

La

RN 7440-03-1 HCA
CN Niobium (8CI, 9CI) (CA INDEX NAME)

Nb

RN 7440-25-7 HCA
CN Tantalum (8CI, 9CI) (CA INDEX NAME)

Ta

RN 7440-32-6 HCA
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-45-1 HCA
CN Cerium (8CI, 9CI) (CA INDEX NAME)

Ce

RN 7440-58-6 HCA
CN Hafnium (8CI, 9CI) (CA INDEX NAME)

Hf

RN 7440-62-2 HCA
CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

RN 7440-67-7 HCA
CN Zirconium (8CI, 9CI) (CA INDEX NAME)

Zr

IC ICM H01M004-58
ICS H01M004-62
NCL 429218200
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST **hydrogen storage** material use fuel cell powered vehicle
IT Electric vehicles
Fuel cells
Hydriding
(**hydrogen-storage** material for use in fuel cell powered vehicles)
IT Alloys, uses
Carbon black, uses
Carbonaceous materials (technological products)
Fullerenes
(**hydrogen-storage** material for use in fuel cell powered vehicles)
IT Semiconductor materials
(oxide; **hydrogen-storage** material for use in fuel cell powered vehicles)
IT 7440-44-0, Activated carbon, uses
(activated; **hydrogen-storage** material for use in fuel cell powered vehicles)
IT 1333-74-0, Hydrogen, uses
(**hydrogen-storage** material for use in fuel cell powered vehicles)
IT 12035-60-8P 12057-65-7P 12196-72-4P
(**hydrogen-storage** material for use in fuel cell powered vehicles)
IT 1313-99-1, Nickel oxide, uses 1314-13-2, Zinc oxide, uses
1332-29-2, Tin oxide 1332-37-2, Iron oxide, uses 1344-70-3,

Copper oxide 7439-91-0, Lanthanum, uses 7440-03-1
, Niobium, uses 7440-25-7, Tantalum, uses
7440-32-6, Titanium, uses 7440-45-1, Cerium, uses
7440-58-6, Hafnium, uses 7440-62-2, Vanadium, uses
7440-67-7, Zirconium, uses 11099-11-9, Vanadium oxide
11104-61-3, Cobalt oxide 11118-57-3, Chromium oxide 11129-60-5,
Manganese oxide 13463-67-7, Titanium oxide, uses
(hydrogen-storage material for use in fuel
cell powered vehicles)

L69 ANSWER 10 OF 28 HCA COPYRIGHT 2004 ACS on STN

137:251482 Preparation of a **fine-grained** doped

graphite material and its out-gassing property. Fan,
Zhuang-jun; Zhai, Geng-tai; Chen, Jun-ling; Li, Jian-gang; Song,
Jin-ren; Liu, Lang (Institute of Coal Chemistry, Chinese Academy of
Sciences, Taiyuan, 030001, Peop. Rep. China). Xinxing Tan Cailiao,
17(2), 51-55 (Chinese) 2002. CODEN: XTCAFT. ISSN: 1007-8827.
Publisher: Kexue Chubanshe.

AB A ball-milling dispersion method has been developed for the prepn.
of multi-element (Ti, Si, B)-doped **graphite** with starting
mixt. powders below 100 nm. Such doped **graphite** has high
thermal cond. and excellent mech. properties (116 MPa). The
out-gassing behavior of doped **graphite** BM (with
ball-milling) and CM (without ball-milling) showed that there was no
difference before and after electron beam irradiation. However, the
emission of H₂, H₂O, CO, esp. CO₂ of BM was much less than that of
CM. A **fine-grained** microstructure of BM was
obsd. by SEM. The particle size, distribution and phase compn. were
investigated with EDX, TEM and XRD. Correlations between
microstructure and properties of such doped **graphite** are
discussed.

IT 7782-42-5, **Graphite**, processes

(B-Si-Ti-doped; effects of ball milling on prepn. and properties
of **fine-grained** (Si + B + Ti)-doped
graphite and effects of electron beam irradiation on
out-gassing property)

RN 7782-42-5 HCA

CN Graphite (8CI, 9CI) (CA INDEX NAME)

C

IT 1333-74-0, **Hydrogen**, processes

(adsorbed; effects of ball milling on prepn. and
properties of **fine-grained** (Si + B +
Ti)-doped **graphite** and effects of electron beam irradiation
on out-gassing property)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H-H

IT 7440-32-6, Titanium, uses
(dopant; effects of ball milling on prepn. and properties of
fine-grained (Si + B + Ti)-doped
graphite and effects of electron beam irradiation on
out-gassing property)

RN 7440-32-6 HCA

CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

CC 57-8 (Ceramics)

ST **graphite** doping ball milling property out gassing

IT Ball milling

Bending strength

Electric resistance

Particle size

Particle size distribution

Porosity

Thermal conductivity

(effects of ball milling on prepn. and properties of **fine**
-grained (Si + B + Ti)-doped **graphite** and
effects of electron beam irradiation on out-gassing property)

IT Electron beams

(irradiation; effects of ball milling on prepn. and properties of
fine-grained (Si + B + Ti)-doped
graphite and effects of electron beam irradiation on
out-gassing property)

IT 7782-42-5, **Graphite**, processes

(B-Si-Ti-doped; effects of ball milling on prepn. and properties
of **fine-grained** (Si + B + Ti)-doped
graphite and effects of electron beam irradiation on
out-gassing property)

IT 124-38-9, Carbon dioxide, processes 630-08-0, Carbon monoxide,
processes 1333-74-0, **Hydrogen**, processes
7732-18-5, Water, processes

(adsorbed; effects of ball milling on prepn. and
properties of **fine-grained** (Si + B +
Ti)-doped **graphite** and effects of electron beam irradiation
on out-gassing property)

IT 7440-21-3, Silicon, uses 7440-32-6, Titanium, uses

7440-42-8, Boron, uses

(dopant; effects of ball milling on prepn. and properties of

- fine-grained** (Si + B + Ti)-doped **graphite** and effects of electron beam irradiation on out-gassing property)
- IT 409-21-2, Silicon carbide sic, formation (nonpreparative)
12045-63-5, Titanium boride tib2 12069-32-8, Boron carbide b4c
12070-08-5, Titanium carbide tic
(secondary phase; effects of ball milling on prep. and properties of **fine-grained** (Si + B + Ti)-doped **graphite** and effects of electron beam irradiation on out-gassing property)
- L69 ANSWER 11 OF 28 HCA COPYRIGHT 2004 ACS on STN
136:347277 Electrochemical reduction of nickel(II) hydroxide deposited on carbon powder and application to a new activation method for **hydrogen storage** alloy negative electrodes.
Morishita, Shinya; Isogai, Yoshihiro; Itoh, Kazuhiko; Towata, Shin-ichi; Abe, Katsushi (Toyota Central Research and Development Laboratories, Inc., Nagakute, Aichi, 480-1192, Japan). Nippon Kagaku Kaishi (2), 129-133 (Japanese) 2002. CODEN: NKAKB8. ISSN: 0369-4577. Publisher: Nippon Kagakkai.
- AB After cathodic polarization, nickel(II) hydroxide-deposited carbon powder [Ni(OH)2/C] was studied by XRD, magnetism measurement, and TEM observation. More than 1.4% of the nickel(II) hydroxide deposited on the surface of the carbon powder was electrochem. reduced and **fine nickel particles** were formed. Since the **fine nickel particles** act as active sites for charge/discharge reactions, the initial activation of **hydrogen storage** alloy neg. electrodes was promoted by adding Ni(OH)2/C.
- IT 7440-44-0, Carbon, uses
(electrochem. redn. of Ni(OH)2 on carbon powder and application to activation method for **hydrogen storage** alloy electrodes)
- RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)
- C
- IT 417704-53-1, Aluminum 1.9, cerium 9.8, cobalt 9.9, lanthanum 15, manganese 3.9, neodymium 7.3, nickel 51, praseodymium 1.9
(electrochem. redn. of nickel hydroxide deposited on carbon powder and application to activation for **hydrogen storage** alloy neg. electrodes of)
- RN 417704-53-1 HCA
CN Nickel alloy, base, Ni 51, La 15, Co 9.9, Ce 9.8, Nd 7.3, Mn 3.9, Al 1.9, Pr 1.9 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
=====+=====+=====		
Ni	51	7440-02-0
La	15	7439-91-0
Co	9.9	7440-48-4
Ce	9.8	7440-45-1
Nd	7.3	7440-00-8
Mn	3.9	7439-96-5
Al	1.9	7429-90-5
Pr	1.9	7440-10-0

- CC 72-2 (Electrochemistry)
Section cross-reference(s): 52, 66, 77
- ST electrochem redn nickel hydroxide deposited carbon powder; nickel hydroxide activation **hydrogen storage** alloy neg electrode; battery **hydrogen storage** electrode
activation nickel hydroxide **carbon**
- IT Battery anodes
(activation of **hydrogen storage** alloy)
- IT Reduction, electrochemical
(of nickel hydroxide on carbon powder and application to activation method for **hydrogen storage** alloy electrodes)
- IT 1333-74-0, Hydrogen, uses **7440-44-0**, Carbon, uses (electrochem. redn. of Ni(OH)₂ on carbon powder and application to activation method for **hydrogen storage** alloy electrodes)
- IT **417704-53-1**, Aluminum 1.9, cerium 9.8, cobalt 9.9, lanthanum 15, manganese 3.9, neodymium 7.3, nickel 51, praseodymium 1.9 (electrochem. redn. of nickel hydroxide deposited on carbon powder and application to activation for **hydrogen storage** alloy neg. electrodes of)
- IT 12054-48-7, Nickel hydroxide
(electrochem. redn. on carbon powder and application to activation method for **hydrogen storage** alloy electrodes)

L69 ANSWER 12 OF 28 HCA COPYRIGHT 2004 ACS on STN
136:156864 Vibrational Sum Frequency Spectroscopy on Pd(111) and Supported Pd **Nanoparticles**: CO Adsorption from Ultrahigh Vacuum to Atmospheric Pressure. Unterhalt, Holger; Rupprechter, Guenther; Freund, Hans-Joachim (Chemical Physics Department, Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, D-14195, Germany). Journal of Physical Chemistry B, 106(2), 356-367 (English) 2002. CODEN: JPCBFK. ISSN: 1089-5647. Publisher: American Chemical Society.

AB The adsorption of CO on Pd(111) and on Al₂O₃-supported Pd

nanoparticles was studied by picosecond IR-visible sum frequency generation (SFG) vibrational spectroscopy in a pressure range from 10^{-7} to 1000 mbar and at 100-520 K. Under ultrahigh vacuum (UHV), the samples were further characterized by LEED, Auger electron spectroscopy (AES), and temp.-programmed desorption (TPD). Identical high coverage (satn.) CO structures were obsd. on Pd(111) under UHV conditions (10^{-7} mbar, 100 K) and at high pressure (e.g., 1 mbar, 190 K). No indications of pressure-induced surface rearrangements of Pd(111) were evident from SFG and LEED. SFG spectra of CO adsorption on defect-rich Pd(111) revealed an addnl. peak that was attributed to adsorption on defect (step or edge) sites. The CO adsorbate structure on supported Pd **nanoparticles** is different from that on Pd(111) and to be more similar to that on stepped or strongly **sputtered** Pd(111). At low pressure, the adsorption site occupancy depended on the particle surface structure and temp. CO preferentially adsorbed in bridge sites on well-faceted Pd particles, while on more defective Pd particles, on-top sites were occupied as well. However, at 200 mbar CO, an adsorption site occupancy was obtained that was nearly independent of the particle surface structure. While the surface structure of the Pd particles remained unchanged upon high-pressure gas exposure, an annealing treatment to 300-400 K was able to order the Pd particle surface. Gas mixts. of CO and hydrogen on Pd(111) showed SFG spectra similar to the pure CO case indicating the absence of a strong interaction between CO and hydrogen.

- CC 66-3 (Surface Chemistry and Colloids)
Section cross-reference(s): 73
- ST vibrational sum frequency spectroscopy palladium surface carbon monoxide adsorption; alumina **supported** palladium **nanoparticle** carbon monoxide adsorption
- IT **Adsorption**
(coadsorption; **hydrogen** and CO coadsorption on Pd(111) and on alumina-supported Pd **nanoparticles** using vibrational sum frequency spectroscopy)
- IT Vibrational spectra
(sum frequency generation; of CO adsorbed on Pd(111) and on alumina-supported Pd **nanoparticles**)
- IT Sum-frequency generation
(vibrational spectra; of CO adsorbed on Pd(111) and on alumina-supported Pd **nanoparticles**)
- IT 630-08-0, Carbon monoxide, properties 7440-05-3, Palladium, properties
(CO adsorption on Pd(111) and on alumina-supported Pd **nanoparticles** using vibrational sum frequency spectroscopy)
- IT 1333-74-0, Hydrogen, properties
(hydrogen and CO coadsorption on Pd(111) and on alumina-supported

Pd **nanoparticles** using vibrational sum frequency spectroscopy)

L69 ANSWER 13 OF 28 HCA COPYRIGHT 2004 ACS on STN

136:104317 Heat pump apparatus. Osumi, Yasuaki; Tsuboi, Toshiyuki; Kataoka, Fumiaki (Futaba Denshi Kogyo Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2002005539 A2 20020109, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-188019 20000622.

AB The title app. includes a 1st container having **C-based H-absorbing** material accommodated therein, a 2nd container having **H-absorbing** alloy accommodated therein, and both containers are connected via a pipe and a valve; while H is released from the **C-based H-absorbing** material or the **H-absorbing** alloy, it is absorbed by the other side, and the **H-absorbing** alloy generates or absorbs heat. The **H-absorbing** alloy is a multicomponent alloy of the La-Ni, misch metal-Ni, Ti-Fe, Ti-Mn, Ti-Cr, Zr-Fe, V-based or Mg-Ni type. The **C-based H-absorbing** material can be **graphite** intercalation compd., **activated C**, **C nanotubes**, **C nanofibers**, **C nanohorns** or **nanoparticles**, etc.

IT 1333-74-0, **Hydrogen**, processes
(**absorption** and **desorption** of; heating pump app. with **carbon-based hydrogen-absorbing** material and **hydrogen-absorbing** alloy in different containers)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H-H

IT 7440-44-0, **Carbon**, uses 11123-80-1
12618-08-5 12783-48-1 54741-72-9
(**hydrogen-absorbing**; heating pump app. with **carbon-based hydrogen-absorbing** material and **hydrogen-absorbing** alloy in different containers)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

RN 11123-80-1 HCA
CN Titanium alloy, base, Ti,Fe (9CI) (CA INDEX NAME)

Component Component
 Registry Number

=====+=====

Ti 7440-32-6
Fe 7439-89-6

RN 12618-08-5 HCA

CN Titanium alloy, base, Ti,Mn (9CI) (CA INDEX NAME)

Component Component
 Registry Number

=====+=====

Ti 7440-32-6
Mn 7439-96-5

RN 12783-48-1 HCA

CN Zirconium alloy, base, Zr,Fe (9CI) (CA INDEX NAME)

Component Component
 Registry Number

=====+=====

Zr 7440-67-7
Fe 7439-89-6

RN 54741-72-9 HCA

CN Lanthanum alloy, base, La,Ni (9CI) (CA INDEX NAME)

Component Component
 Registry Number

=====+=====

La 7439-91-0
Ni 7440-02-0

IT 7782-42-5, Graphite, uses 11147-24-3

(hydrogen-absorbing; heating pump app. with
carbon-based hydrogen-
absorbing material and hydrogen-
absorbing alloy in different containers)

RN 7782-42-5 HCA

CN Graphite (8CI, 9CI) (CA INDEX NAME)

C

RN 11147-24-3 HCA

CN Magnesium alloy, base, Mg,Ni (9CI) (CA INDEX NAME)

Component	Component Registry Number
=====+=====	
Mg	7439-95-4
Ni	7440-02-0

IC	ICM F25B017-12
	ICS C22C014-00; C22C019-00; C22C038-00; C22C038-14
CC	47-4 (Apparatus and Plant Equipment)
	Section cross-reference(s): 49, 56
ST	heat pump app hydrogen absorption desorption; carbon based hydrogen absorbing material heat pump; hydrogen absorbing alloy heat pump
IT	Nanoparticles (carbon; heating pump app. with carbon-based hydrogen-absorbing material and hydrogen-absorbing alloy in different containers)
IT	Nanotubes (carbon; heating pump app. with carbon-based hydrogen-absorbing material and hydrogen-absorbing alloy in different containers)
IT	Heat pumps (heating pump app. with carbon-based hydrogen-absorbing material and hydrogen-absorbing alloy in different containers)
IT	Alloys, uses Intercalation compounds (hydrogen-absorbing ; heating pump app. with carbon-based hydrogen- absorbing material and hydrogen- absorbing alloy in different containers)
IT	Carbon fibers, uses (nanofibers; heating pump app. with carbon- based hydrogen-absorbing material and hydrogen-absorbing alloy in different containers)
IT	Vanadium alloy, base (hydrogen-absorbing ; heating pump app. with carbon-based hydrogen- absorbing material and hydrogen- absorbing alloy in different containers)
IT	1333-74-0, Hydrogen , processes (absorption and desorption of; heating pump app. with carbon-based hydrogen-

- absorbing material and hydrogen-
absorbing alloy in different containers)
- IT 7440-44-0, Carbon, uses 11123-80-1
12618-08-5 12621-17-9 12783-48-1
54741-72-9 62699-13-2
(hydrogen-absorbing; heating pump app. with
carbon-based hydrogen-
absorbing material and hydrogen-
absorbing alloy in different containers)
- IT 7782-42-5, Graphite, uses 11147-24-3
(hydrogen-absorbing; heating pump app. with
carbon-based hydrogen-
absorbing material and hydrogen-
absorbing alloy in different containers)

L69 ANSWER 14 OF 28 HCA COPYRIGHT 2004 ACS on STN

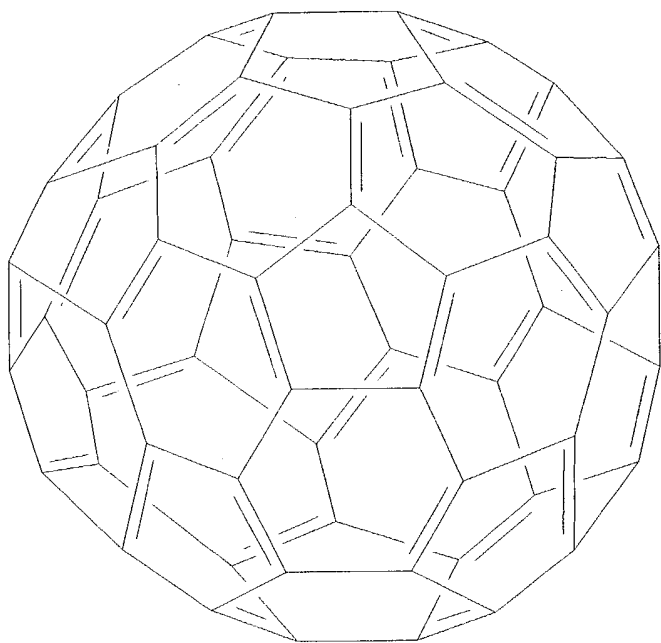
134:225068 **Hydrogen absorbing carbonaceous**
materials and their manufacture, and batteries and fuel cells.
Shiraishi, Masashi; Negishi, Eisuke; Hinokuma, Koichiro; Yamada,
Atsuo; Kajiura, Hisashi; Tanaka, Koichi; Ata, Masafumi (Sony Corp.,
Japan). PCT Int. Appl. WO 2001017900 A1 20010315, 232 pp.
DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR,
BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD,
GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK,
LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT,
RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ,
VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF,
BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT,
LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (Japanese). CODEN:
PIXXD2. APPLICATION: WO 2000-JP6199 20000911. PRIORITY: JP
1999-255743 19990909; JP 1999-285639 19991006; JP 1999-300381
19991022; JP 1999-303968 19991026; JP 1999-322975, 19991112; JP
1999-330948 19991122; JP 1999-351701 19991210; JP 2000-127113
20000427.

- AB The **carbonaceous** materials **absorbs H**
as protons. Preferably, the **carbonaceous** materials have
work function .gtoreq.4.9 eV and are C **nanotubes**,
fullerenes, or **fullerene** mixts. contg. metals or
electrode donors, e.g., F or amines. The **carbonaceous**
materials are prepd. by **arc discharge**, CVD,
laser abrasion, or high temp. treatment of SiC. The batteries use
electrodes contg. the **carbonaceous** material. The fuel
cells use the **H absorbing carbonaceous**
materials as H source for anodes.
- IT **99685-96-8DP**, C60 **Fullerene**, fluorinated
99685-96-8P, C60 **Fullerene** **115383-22-7P**,
C70 **Fullerene**
(structure and manuf. of **hydrogen absorbing**

carbonaceous materials for battery and fuel cell
electrodes)

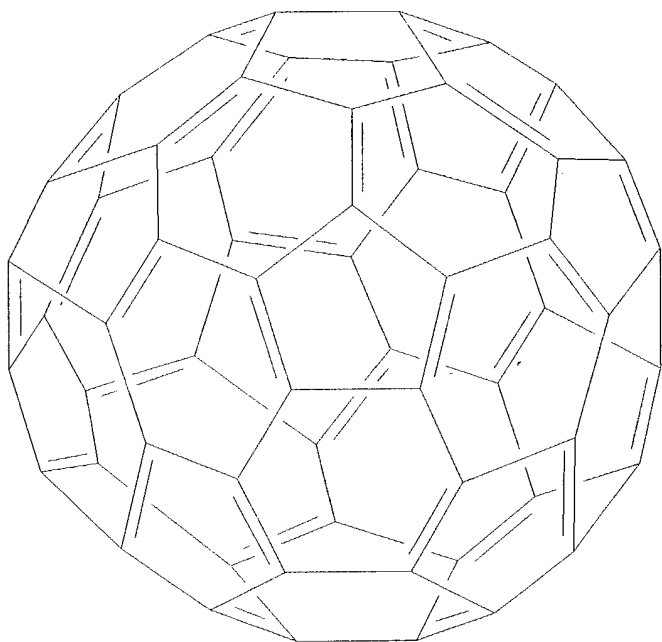
RN 99685-96-8 HCA

CN [5,6]Fullerene-C60-Ih (9CI) (CA INDEX NAME)



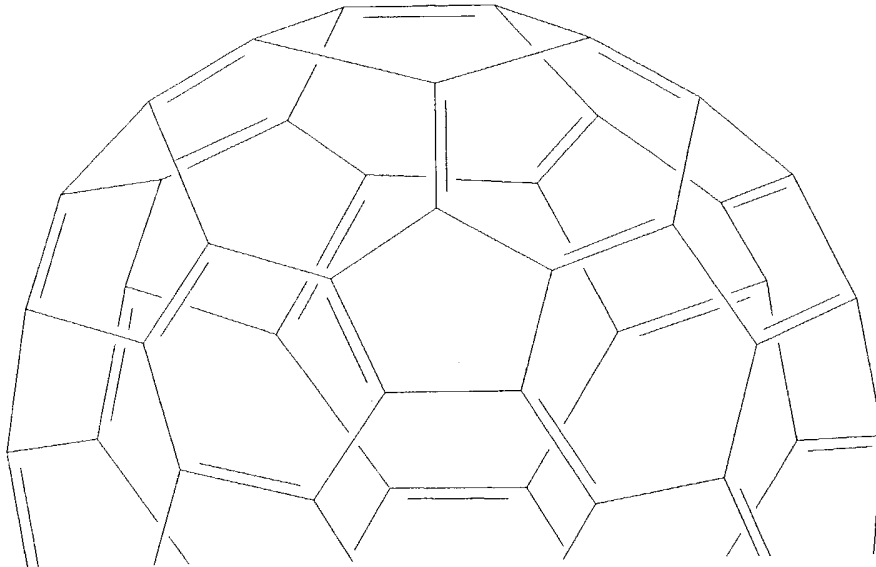
RN 99685-96-8 HCA

CN [5,6]Fullerene-C60-Ih (9CI) (CA INDEX NAME)

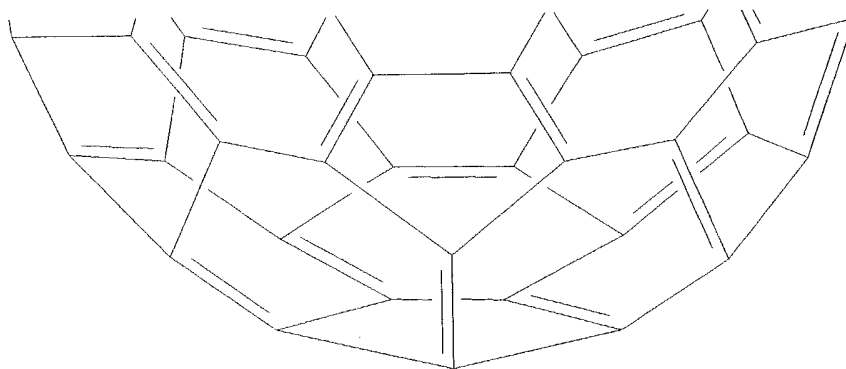


RN 115383-22-7 HCA
CN [5,6]Fullerene-C70-D5h(6) (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 2-A



IT 7440-32-6P, Titanium, uses 7440-62-2P, Vanadium,
uses
(structure and manuf. of metal contg. **hydrogen**)

absorbing carbonaceous materials for battery
and fuel cell electrodes)

RN 7440-32-6 HCA

CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-62-2 HCA

CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

IC ICM C01B031-02

ICS C01B031-04; C01B003-00; H01M004-24; H01M004-38; H01M010-24;
H01M012-08; H01M008-04; B01J020-20

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **hydrogen absorbing carbonaceous**

material structure manuf; battery electrode **hydrogen**

absorbing carbonaceous material; fuel cell anode

hydrogen absorbing carbonaceous

material; carbon nanotube **hydrogen**

absorbing electrode; **fullerene hydrogen**

absorbing electrode

IT **Nanotubes**

(**carbonaceous**; structure and manuf. of **hydrogen**

absorbing carbonaceous materials for battery

and fuel cell electrodes)

IT Vapor deposition process

(chem.; manuf. of **hydrogen absorbing**

carbonaceous materials by **arc discharge**

for battery and fuel cell electrodes)

IT Work function

(**hydrogen absorbing carbonaceous**

materials with controlled work function for battery and fuel cell

electrodes)

IT Abrasion

(laser; manuf. of **hydrogen absorbing**

carbonaceous materials by laser abrasion for battery and

fuel cell electrodes)

IT Electric arc

(manuf. of **hydrogen absorbing**

carbonaceous materials by **arc discharge**

for battery and fuel cell electrodes)

IT Lasers

(manuf. of **hydrogen absorbing**

carbonaceous materials by laser abrasion for battery and

- fuel cell electrodes)
- IT **Carbonaceous** materials (technological products)
(structure and manuf. of **hydrogen absorbing carbonaceous** materials for battery and fuel cell electrodes)
- IT Fuel cell anodes
(structure and manuf. of **hydrogen absorbing carbonaceous** materials for hydrogen source for fuel cell anodes)
- IT Battery anodes
(structure and manuf. of **hydrogen absorbing carbonaceous** materials for secondary battery anodes)
- IT Battery electrodes
Primary batteries
(structure and manuf. of **hydrogen absorbing** metal contg. **carbonaceous** materials for air battery electrodes)
- IT 409-21-2, Silicon carbide (SiC), processes
(manuf. of **hydrogen absorbing carbonaceous** materials by heat treatment of silicon carbide for battery and fuel cell electrodes)
- IT **99685-96-8DP, C60 Fullerene, fluorinated**
99685-96-8P, C60 Fullerene 115383-22-7P, C70 Fullerene
(structure and manuf. of **hydrogen absorbing carbonaceous** materials for battery and fuel cell electrodes)
- IT 1333-74-0, Hydrogen, miscellaneous
(structure and manuf. of **hydrogen absorbing carbonaceous** materials for battery and fuel cell electrodes)
- IT 7439-89-6P, Iron, uses 7440-06-4P, Platinum, uses 7440-20-2P, Scandium, uses **7440-32-6P**, Titanium, uses 7440-48-4P, Cobalt, uses 7440-54-2P, Gadolinium, uses **7440-62-2P**, Vanadium, uses
(structure and manuf. of metal contg. **hydrogen absorbing carbonaceous** materials for battery and fuel cell electrodes)

L69 ANSWER 15 OF 28 HCA COPYRIGHT 2004 ACS on STN

133:352572 Analysis of the activation mechanism of **hydrogen storage** alloy negative electrodes containing palladium ion-adsorbed carbon powder. Morishita, Shinya; Fujita, Katsuyoshi; Ito, Kazuhiko; Towata, Shinichi; Abe, Katsushi (Toyota Central Research and Development Laboratories, Inc., Yokomichi, Nagakute, Aichi, 480-1192, Japan). Nippon Kagaku Kaishi (11), 773-778 (Japanese) 2000. CODEN: NKAKB8. ISSN: 0369-4577. Publisher: Nippon Kagakkai.

AB In the case of Ni-MH batteries, the initial activation of the **hydrogen storage** alloy neg. electrodes was promoted by adding palladium ion-adsorbed carbon powder (Pd²⁺/C). From electrochem. impedance anal. of the neg. electrodes, and TEM observation and XRD measurement of Pd²⁺/C after cathodic polarization, the mechanism of this phenomenon was presumed to be as follows: (1) palladium ion is reduced to **fine** palladium **particles** during the first charge, (2) the **fine** palladium **particles** act as active sites for charge/discharge reactions, and (3) pulverization of the alloy particles occurs due to vol. expansion by the **hydrogen absorption** into the alloy, and new active sites are formed on the fresh alloy surface. Therefore, the promotion of the initial activation of the neg. electrode is obsd. by addn. of Pd²⁺/C.

IT 304865-88-1
(anal. of activation mechanism of **hydrogen storage** alloy anodes contg. palladium ion-adsorbed carbon powder)

RN 304865-88-1 HCA

CN Nickel alloy, base, Ni 53, La 15, Co 9.7, Ce 9.6, Pr 7, Mn 2.6, Al 1.9, Nd 1.7 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	53	7440-02-0
La	15	7439-91-0
Co	9.7	7440-48-4
Ce	9.6	7440-45-1
Pr	7	7440-10-0
Mn	2.6	7439-96-5
Al	1.9	7429-90-5
Nd	1.7	7440-00-8

IT 7440-44-0, Carbon, uses
(anal. of activation mechanism of **hydrogen storage** alloy anodes contg. palladium ion-adsorbed carbon powder)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST battery anode palladium **adsorbed** carbon **hydrogen storage** alloy

- IT Battery anodes
(anal. of activation mechanism of **hydrogen storage** alloy anodes contg. palladium ion-adsorbed carbon powder)
- IT 304865-88-1
(anal. of activation mechanism of **hydrogen storage** alloy anodes contg. palladium ion-adsorbed carbon powder)
- IT 7440-44-0, Carbon, uses 16065-88-6, Palladium(2+), uses
(anal. of activation mechanism of **hydrogen storage** alloy anodes contg. palladium ion-adsorbed carbon powder)
- IT 1333-74-0, Hydrogen, uses
(anal. of activation mechanism of **hydrogen storage** alloy anodes contg. palladium ion-adsorbed carbon powder)

L69 ANSWER 16 OF 28 HCA COPYRIGHT 2004 ACS on STN

133:94917 Nano-diamond films deposited by direct current **glow discharge** assisted chemical vapor deposition. Heiman, A.; Gouzman, I.; Christiansen, S. H.; Strunk, H. P.; Hoffman, A. (Solid State Institute and Wolfson Center for Interfaces, Chemistry Department, Technion-Israel Institute of Technology, Haifa, 32000, Israel). Diamond and Related Materials, 9(3-6), 866-871 (English) 2000. CODEN: DRMTE3. ISSN: 0925-9635. Publisher: Elsevier Science S.A..

AB Continuous carbon films are deposited by the d.c. (DC) **glow discharge** assisted chem. vapor deposition method using a hydrogen-methane gas mixt. As a result of the DC-**glow discharge**-surface interaction, the substrate is covered by a film whose properties are strongly affected by the **glow discharge** and substrate conditions. It was found that under appropriate combination of the exptl. parameters, a nano-sized carbon composite film contg. a predominating diamond phase can be produced. The properties of the deposited carbon films were studied as a function of exptl. conditions by a no. of complementary techniques. The compn. of the films was assessed by electron spectroscopy and the elastic recoil detection method; the morphol. and structure of the films were investigated by high-resoln. scanning and transmission electron microscopy (HR TEM and HR SEM). Particular attention was paid to the studies of chem. bonding of the deposited materials. For this purpose, the near-edge X-ray absorption fine structure (NEXAFS) and XPS and electron energy loss spectroscopy (EELS) techniques were used. The av. film d. was measured by Rutherford backscattering spectrometry. Electron diffraction, NEXAFS and EELS measurements render unambiguous evidence of diamond phase formation by the DC-**glow discharge** process. The nano-size dimensions of the

deposited material were detd. from both HR-SEM and -TEM measurements. The crit. role of substrate temp. for the formation of **nano-diamond particles** was established based on the spectroscopic and microscopic results. **Hydrogen adsorption**/desorption appears to be a crit. factor in this process.

IT 7440-44-0P, Carbon, properties
 (nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)
 RN 7440-44-0 HCA
 CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 66-3 (Surface Chemistry and Colloids)
 Section cross-reference(s): 75

IT Hydrogenation
 Nanostructures
 Phase composition
 Surface structure
 (nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

IT **Adsorption**
 (of **hydrogen**; nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

IT Vapor deposition process
 (plasma; nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

IT 7440-44-0P, Carbon, properties
 (nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

IT 1333-74-0, Hydrogen, processes
 (nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

IT 74-82-8, Methane, reactions
 (nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

IT 7440-21-3, Silicon, processes
 (substrates; nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

L69 ANSWER 17 OF 28 HCA COPYRIGHT 2004 ACS on STN

132:314898 Electrochemical investigation on hydride electrode with tungsten carbide additive. Yang, Xiao-Guang; Zhang, Xiao-Bin; Tan, Guo-Long; Zhang, Wen-Kui; Lei, Yong-Quan; Wang, Qi-Dong; Wu, Xi-Jun (Department of Materials Science and Engineering, Zhejiang

University, Hangzhou, 310027, Peop. Rep. China). Transactions of Nonferrous Metals Society of China, 10(1), 60-63 (English) 2000. CODEN: TNMCEW. ISSN: 1003-6326. Publisher: Transactions of Nonferrous Metals Society of China.

AB Nano-meter-sized WC powder (1.apprx.20 nm) was synthesized by mechanochem. explosion synthesis. The catalytic property of WC powder was discovered to decomp. the mol. water and chem.-
adsorb H atoms in KOH soln., and accelerate the combination reaction of hydrogen during the cathodic polarization, thus a neg. effect on the activation was found because of easy H₂ emission. Electrochem. impedance spectroscopy (EIS) showed that the **adsorbed hydrogen** atoms on the surface of WC are first electrochem. oxidized due to their lower chem. bonding, and that the low cond. of WC powder also increases the internal resistance of electrodes.

IT 1333-74-0, **Hydrogen**, properties
 (adsorption on Zr_{0.5}Ti_{0.5}(Mn_{0.25}V_{0.15}Ni_{0.55})₂ electrode doped with WC additive in KOH soln.)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H-H

IT 247066-89-3
 (electrochem. investigation on hydride electrode with tungsten carbide additive)

RN 247066-89-3 HCA

CN Nickel alloy, base, Ni 37,Zr 26,Mn 16,Ti 14,V 8.6 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	37	7440-02-0
Zr	26	7440-67-7
Mn	16	7439-96-5
Ti	14	7440-32-6
V	8.6	7440-62-2

IT 7440-44-0, **Carbon**, properties
 (explosion synthesis od WC from mixt. contg.)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 72-2 (Electrochemistry)
 Section cross-reference(s): 52, 56

ST tungsten carbide electrode performance **hydrogen storage** alloys

IT Electrodes
Nanoparticles
 (electrochem. investigation on hydride electrode with tungsten carbide additive)

IT **Adsorption**
 (of **hydrogen** on $Zr_{0.5}Ti_{0.5}(Mn_{0.25}V_{0.15}Ni_{0.55})_2$ electrode doped with WC additive in KOH soln.)

IT **1333-74-0, Hydrogen, properties**
 (adsorption on $Zr_{0.5}Ti_{0.5}(Mn_{0.25}V_{0.15}Ni_{0.55})_2$ electrode doped with WC additive in KOH soln.)

IT **247066-89-3**
 (electrochem. investigation on hydride electrode with tungsten carbide additive)

IT 1314-35-8, Tungsten trioxide, properties 7439-95-4, Magnesium, properties **7440-44-0, Carbon, properties**
 (explosion synthesis of WC from mixt. contg.)

L69 ANSWER 18 OF 28 HCA COPYRIGHT 2004 ACS on STN
 130:55681 **Hydrogen-absorbing** alloys with long cycle life and their manufacture. Tsukahara, Makoto; Isomura, Akihito; Takahashi, Kunio (Aisin Seiki Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 10317075 A2 19981202 Heisei, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1997-124039 19970514.

AB The title **H-absorbing** alloys are manufd. by cooling raw material molten metals contg. V, Ti, and Ni for pptn. of TiNi-base alloy phase and/or Laves phase in grain boundaries of matrix phase comprising V-based solid soln. The above raw materials contain **fine powders**, having higher m.p. than that of **H-absorbing** alloys, which become cores in solidification of the matrix phase. The **H-absorbing** alloys have long service life.

IT **159025-74-8 217491-81-1**
 (H-absorbing alloys contg. V-base matrixes and TiNi-base alloy and/or Laves phases manufd. by pptn. with cores)

RN 159025-74-8 HCA

CN Vanadium alloy, base, V 55, Ti 17, Hf 15, Ni 12 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
V	55	7440-62-2
Ti	17	7440-32-6
Hf	15	7440-58-6

Ni 12 7440-02-0

RN 217491-81-1 HCA

CN Vanadium alloy, base, V 61,Ti 19,Ni 13,Ta 3.4,Nb 1.8,Co 1.2 (9CI)
(CA INDEX NAME)

Component	Component Percent	Component Registry Number
V	61	7440-62-2
Ti	19	7440-32-6
Ni	13	7440-02-0
Ta	3.4	7440-25-7
Nb	1.8	7440-03-1
Co	1.2	7440-48-4

IT 7440-44-0, Carbon, processes
(powders; **H-absorbing** alloys contg. V-base
matrixes and TiNi-base alloy and/or Laves phases manufd. by pptn.
with cores)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IC ICM C22C001-00
ICS C22C014-00; C22C019-00; H01M004-24

CC 56-3 (Nonferrous Metals and Alloys)
Section cross-reference(s): 52

ST **hydrogen absorbing** alloy vanadium titanium
nickel; solidifying core metal **hydrogen absorbing**
alloy; battery anode **hydrogen absorbing** alloy

IT Battery anodes
(**H-absorbing** alloys contg. V-base matrixes
and TiNi-base alloy and/or Laves phases manufd. by pptn. with
cores)

IT Laves phases
(**H-absorbing** alloys contg. V-base matrixes
and TiNi-base alloy and/or Laves phases manufd. by pptn. with
cores)

IT 159025-74-8 217491-81-1
(**H-absorbing** alloys contg. V-base matrixes
and TiNi-base alloy and/or Laves phases manufd. by pptn. with
cores)

IT 1333-74-0, **Hydrogen**, uses
(alloys **absorbing**; **H-absorbing**
alloys contg. V-base matrixes and TiNi-base alloy and/or Laves

phases manufd. by pptn. with cores)

IT 7440-44-0, Carbon, processes 7631-86-9, Silica, processes 12069-94-2, Niobium carbide (NbC) 12070-08-5, Titanium carbide (TiC) 12070-10-9, Vanadium carbide (VC) 12070-12-1, Tungsten carbide (WC) 25583-20-4, Titanium nitride (TiN) (powders; **H-absorbing** alloys contg. V-base matrixes and TiNi-base alloy and/or Laves phases manufd. by pptn. with cores)

L69 ANSWER 19 OF 28 HCA COPYRIGHT 2004 ACS on STN

129:318631 On the development of new **hydrogen storage** materials FeTi(Zr), Mg-xwt.% CFMmNi5 and Mg2Ni (**nanoparticle**) for improved hydrogenation characteristics. Singh, B. K.; Raman, S. S. Sai; Singh, Arvind Kumar; Bansal, B. B.; Srivastava, O. N. (Department of Physics, Banaras Hindu University, Varanasi, 221005, India). Hydrogen Power: Theoretical and Engineering Solutions, Proceedings of the HYPOTHESIS Symposium, 2nd, Grimstad, Norway, Aug. 18-22, 1997, Meeting Date 1997, 275-289. Editor(s): Saetre, T. O. Kluwer: Dordrecht, Neth. (English) 1998. CODEN: 66STAR.

AB FeTi is one of well known state of the art **hydrogen storage** material. However its activation is rather difficult and research needs to be done to make the activation amenable. We have therefore undertaken a systematic study to find out the most appropriate elemental substitution which can turn the material readily activated. The basic idea behind them is to provide catalytic decompn. of hydrogen and reduce the activation temp. of FeTi. The Fe1-xZrxTi1+y (x=0.2, y=0.3) alloy has been successfully synthesized using R.F. induction furnace (12 KW) under argon atm. in a previously outgassed **graphite** crucible. The structural characterization (XRD) revealed that the as synthesized sample is multiphasic in nature and it exhibit the phases FeTi, Fe2Ti, FeTi2 and Ti resp. P-C. isotherms were exptl. detd. and showed the storage capacity .apprx.1.20 wt% at 200.degree.. The activation as well as desorption kinetics of FeTi is found to be significantly improved by addn. of Zr corresponding to Fe0.8Zr0.2 Ti1.3. In search of new high **hydrogen storage** (>1.5 wt%) capacities, alloys with general formula Mg-x wt% CFMmNi5 (Ce-free MmNi5; x=20, 30, 40 and 50) have been successfully synthesized. The as-synthesized composite materials have been activated at 550.degree..+-10.degree. under a hydrogen pressure of .apprx.34 kg cm-2 and their **hydrogen storage** capacities and desorption kinetics have been evaluated. The new composite **hydrogen storage** materials, in contrast to the native ingredient CFMmNi5 have been found to possess much higher storage capacity (e.g. .apprx.5.6. wt% for Mg-30wt% CFMmNi5 as compared to .apprx.1.4wt% for CFMmNi5 alone) and to exhibit favorable absorption-desorption kinetics, typified to be about .apprx.140 cm3 min-1. The structural, micro-structural

characteristics have been explored using XRD, TEM, SEM and EDAX techniques. The synthesis of the **hydrogen-storage** alloy Mg₂Ni has been carried out through a single-step mech. alloying and energy ball mill. The synthesized ball-milled Mg₂Ni alloy has been found to exist in the form of **fine (nano) particles** with sizes to about 40 .ANG.. The **nanoparticle** form has been found to lead to easy activation for hydrogenation by annealing at 300.degree. (about 10⁻⁴ torr vacuum) for 30 min. and hydrogen uptake has been found to commence from the first cycle itself.

IT 214681-58-0

(development of new **hydrogen storage** materials FeTi(Zr), Mg-Ce-free MmNi₅ and Mg₂Ni **nanoparticle** for improved hydrogenation characteristics)

RN 214681-58-0 HCA

CN Titanium alloy, base, Ti 50, Fe 36, Zr 15 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	50	7440-32-6
Fe	36	7439-89-6
Zr	15	7440-67-7

CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST **hydrogen storage** iron titanium zirconium alloy;
misch metal nickel alloy **hydrogen storage**;
magnesium misch metal nickel **hydrogen storage**

IT Absorption
Absorption kinetics
Composites

Nanoparticles

(development of new **hydrogen storage** materials FeTi(Zr), Mg-Ce-free MmNi₅ and Mg₂Ni **nanoparticle** for improved hydrogenation characteristics)

IT 7440-02-0, Nickel, uses 12057-65-7 54426-34-5

214681-58-0

(development of new **hydrogen storage** materials FeTi(Zr), Mg-Ce-free MmNi₅ and Mg₂Ni **nanoparticle** for improved hydrogenation characteristics)

IT 1333-74-0, Hydrogen, uses

(development of new **hydrogen storage** materials FeTi(Zr), Mg/Ce-free MmNi₅ and Mg₂Ni **nanoparticle** for improved hydrogenation characteristics)

L69 ANSWER 20 OF 28 HCA COPYRIGHT 2004 ACS on STN

128:300029 Contamination resistance of the Pd coated Ti thin films in

hydrogen absorption. Zhang, Qiangji; Fu, Xiyong; Qi, Qihong; Zhao, Pengji; Zhai, Guoliang; Mou, Fangming (Vacuum Physics Laboratory, Fudan University, Shanghai, 200433, Peop. Rep. China). Zhenkong Kexue Yu Jishu, 17(6), 394-399 (Chinese) 1997. CODEN: CKKSDV. ISSN: 0253-9748. Publisher: Zhenkong Kexue Yu Jishu Zazhishe.

AB Pd was coated on a Ti films by vapor deposition or **sputtering** at a thickness .apprx.10 nm, the **H absorptivity** and the resistance to C and O contamination of the coated Ti films were studied by XPS and AES. The **H absorptivity** of the Ti thin films is related to the electron d. of occupied states (DOS) near Fermi level (detd. by XPS). The DOS of samples with high **H absorption** capability showed a peak near Fermi level, but only a slight change was found for contaminated samples. Probably the effective surface dissoch. sites originated from Pd atoms enhance the surface absorption capability and the resistance to contamination in **hydrogen absorption.**

IT 7440-44-0, Carbon, reactions
(contamination resistance of the Pd coated Ti thin films in **hydrogen absorption**)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IT 7440-32-6, Titanium, properties
(contamination resistance of the Pd coated Ti thin films in **hydrogen absorption**)

RN 7440-32-6 HCA

CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

CC 66-1 (Surface Chemistry and Colloids)

ST surface contamination **hydrogen adsorption**
palladium titanium

IT Adsorption

Auger electron spectroscopy

Density of states

Environmental pollution

Fermi level

Sputtering

Surface state

X-ray photoelectron spectroscopy

(contamination resistance of the Pd coated Ti thin films in

hydrogen absorption)

IT 7440-44-0, Carbon, reactions 7782-44-7, Oxygen, reactions
(contamination resistance of the Pd coated Ti thin films in
hydrogen absorption)

IT 1333-74-0, Hydrogen, properties 7440-05-3, Palladium, properties
7440-32-6, Titanium, properties
(contamination resistance of the Pd coated Ti thin films in
hydrogen absorption)

L69 ANSWER 21 OF 28 HCA COPYRIGHT 2004 ACS on STN

128:246246 Anode catalyst with high activity and long life for fuel
cell, its manufacture, anode, and fuel cell. Suzuki, Nobukazu
(Toshiba Corp., Japan). Jpn. Kokai Tokkyo Koho JP 10074523 A2
19980317 Heisei, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP
1996-229531 19960830.

AB The anode catalyst is Pt or Pt alloy **microparticles**
supported by elec. conductive C powders and H-
absorbing alloy is applied on or near the Pt
microparticles. The H-absorbing alloy
may consist of the 1st transition metal: La, Ti, Zr, and/or V and
the 2nd transition metal: Ni, Co, Fe, Mn, and/or Cr. The manuf. of
the anode catalyst involves (1) heating the C powders at high temp.,
(2) carrying the Pt **microparticles** on the C powders and
(3) applying the H-absorbing alloy. The anode
consists of a substrate and a catalyst layer contg. the catalyst.
Phosphoric acid fuel cell and solid polymer fuel cell having the
anode are also claimed.

IT 7440-62-2, Vanadium, uses 70521-60-7
76446-44-1 85367-91-5 204925-50-8
(hydrogen-absorbing; fuel cell anode catalyst
contg. hydrogen-absorbing alloy for high
activity and long life)

RN 7440-62-2 HCA

CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

RN 70521-60-7 HCA

CN Titanium alloy, base, Ti 45, Co 28, Fe 27 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	45	7440-32-6
Co	28	7440-48-4
Fe	27	7439-89-6

RN 76446-44-1 HCA
 CN Titanium alloy, base, Ti 46,Co 28,Mn 26 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
=====+=====+=====		
Ti	46	7440-32-6
Co	28	7440-48-4
Mn	26	7439-96-5

RN 85367-91-5 HCA
 CN Titanium alloy, base, Ti 46,Fe 43,Ni 8.5,V 2.5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
=====+=====+=====		
Ti	46	7440-32-6
Fe	43	7439-89-6
Ni	8.5	7440-02-0
V	2.5	7440-62-2

RN 204925-50-8 HCA
 CN Platinum alloy, base, Pt 89,Co 5.8,Ti 4.7 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
=====+=====+=====		
Pt	89	7440-06-4
Co	5.8	7440-48-4
Ti	4.7	7440-32-6

IT 7440-44-0, Carbon, uses
 (powders, catalyst support; fuel cell anode catalyst contg.
hydrogen-absorbing alloy for high activity and
 long life)

RN 7440-44-0 HCA
 CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IC ICM H01M004-92
 ICS H01M004-88
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 67
 ST fuel cell anode **hydrogen absorbing** alloy;
 platinum fuel cell anode catalyst

- IT **Carbon black**, uses
(catalyst support; fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)
- IT Catalysts
Fuel cell anodes
(fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)
- IT Platinum alloy
(fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)
- IT 1333-74-0, Hydrogen, processes
(alloy contg., absorbed; fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)
- IT 7440-06-4, Platinum, uses 12714-36-2
(fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)
- IT 7440-05-3, Palladium, uses **7440-62-2**, Vanadium, uses
12057-97-5 12196-72-4 12297-66-4 **70521-60-7**
76446-44-1 85367-91-5 204925-50-8
204925-51-9
(**hydrogen-absorbing**; fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)
- IT **7440-44-0**, Carbon, uses
(powders, catalyst support; fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)

L69 ANSWER 22 OF 28 HCA COPYRIGHT 2004 ACS on STN
126:334617 Electronic states of nanocrystalline carbon. Lopinski, G.P.; Merkulov, V.I.; Lannin, J.S. (Dept. of Physics, Penn State University, University Park, PA, 16802, USA). Materials Research Society Symposium Proceedings, 452(Advances in Microcrystalline and Nanocrystalline Semiconductors--1996), 215-224 (English) 1997. CODEN: MRSPDH. ISSN: 0272-9172. Publisher: Materials Research Society.

AB Electron energy loss spectroscopy (EELS) has been used to investigate the electronic states of isolated, nanocryst. carbon particles. Small carbon nanocrystals were prepd. via **sputter** deposition onto SiO₂ substrates, followed by annealing to 700C. The structure and size distribution of the particles have been characterized by Raman scattering, Auger electron spectroscopy and electron microscopy. EELS observations indicate that a semimetal to semiconductor transition occurs for **particles smaller** than 1nm. In addn., **hydrogen adsorption** is found to significantly

affect the electronic states of these particles, indicating that both finite size and dangling bond effects modify the properties of small carbon nanocrystallites.

IT 1333-74-0, **Hydrogen**, properties
(**adsorption** and effect on electronic states of
nanocryst. carbon)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H-H

IT 7440-44-0D, Carbon, nanocryst., properties
(electronic states)
RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 65-3 (General Physical Chemistry)
Section cross-reference(s): 66
ST electronic state nanocryst carbon EELS; silica **substrate**
carbon nanocrystal **hydrogen adsorption**;
semimetal semiconductor transition nanocryst carbon
IT 1333-74-0, **Hydrogen**, properties
(**adsorption** and effect on electronic states of
nanocryst. carbon)
IT 7440-44-0D, Carbon, nanocryst., properties
(electronic states)

L69 ANSWER 23 OF 28 HCA COPYRIGHT 2004 ACS on STN
121:13937 Alkaline **storage** battery and **hydrogen**
storage alloy particles manufacture for anodes. Fujiwara,
Shozo; Izumi, Yoichi; Moriwaki, Yoshio; Matsumoto, Isao (Matsushita
Electric Industrial Co., Ltd., Japan). Eur. Pat. Appl. EP 591606 A1
19940413, 33 pp. DESIGNATED STATES: R: DE, FR, GB, NL. (English).
CODEN: EPXXDW. APPLICATION: EP 1993-104236 19930316. PRIORITY: JP
1992-297667 19921009.

AB The alk. secondary battery with metal oxide cathode contains
particles of a **hydrogen storage** alloy used as
the anode comprising base particles consisting of **hydrogen**
storage alloy particles 10-50 .mu.m and **fine**
particles consisting of .gtoreq.1 metal, alloy, hydrophobic
resin, catalyst, metal oxide, having a **particle** size
smaller than that of the base **particles** where the
fine particles are very firmly bonded to the
surfaces of the base **particles** (wt. ratio **fine**

/base **particles** 10-1-10-4, size ratio **fine**/base **particles** 10-1-10-3). Bonding of the **fine particles** to the base particles is performed by a surface treatment called mechanofusion (a mechanochem. reaction process) where the base **particles** and the **fine particles** are subjected to a mech. energy, esp. compression and attrition, simultaneously to emboss the surfaces of the base particles and to allow the **fine particles** to be extended and bonded firmly under pressure onto the surfaces of the base particles, thereby coating at least a part of the surfaces of the base **particles** with the **fine particles**.

IT 139634-80-3 155730-93-1

(hydrogen-absorbing, anode contg.,
particulate and coated, in alk. secondary batteries)

RN 139634-80-3 HCA

CN Zirconium alloy, base, Zr 45,Ni 37,Mn 8.1,Cr 5.1,V 5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Zr	45	7440-67-7
Ni	37	7440-02-0
Mn	8.1	7439-96-5
Cr	5.1	7440-47-3
V	5	7440-62-2

RN 155730-93-1 HCA

CN Nickel alloy, base, Ni 54,misch metal 33,Co 7,Mn 3.9,Al 1.9 (9CI)
(CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	54	7440-02-0
Misch metal	33	8049-20-5
Co	7	7440-48-4
Mn	3.9	7439-96-5
Al	1.9	7429-90-5

IT 7440-03-1, Niobium, uses 7440-32-6, Titanium, uses
7440-44-0, Carbon, uses

(particles, **base hydrogen storage**
alloy particles coated with, for battery anode)

RN 7440-03-1 HCA

CN Niobium (8CI, 9CI) (CA INDEX NAME)

Nb

RN 7440-32-6 HCA
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IC ICM H01M006-00
ICS H01M004-38
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST alk secondary battery anode particle; **hydrogen storage** alloy anode particle
IT Rare earth oxides
(particles, base **hydrogen storage** alloy particles coated with, for battery anode)
IT Anodes
(battery, **hydrogen storage** alloy particles with coatings for)
IT 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 12641-38-2
73482-78-7 155730-94-2
(catalyst particles, base **hydrogen storage** alloy particles coated with, for battery anode)
IT 9002-84-0, Ptfе 25067-11-2, Hexafluoropropylene-tetrafluoroethylene copolymer
(coating of, on **hydrogen storage** alloy anodes, in alk. secondary batteries)
IT 139634-80-3 155730-93-1
(**hydrogen-absorbing**, anode contg., particulate and coated, in alk. secondary batteries)
IT 1306-19-0, Cadmium oxide, uses 1306-38-3, Cerium oxide, uses 1309-48-4, Magnesium oxide, uses 1312-81-8, Lanthana 1313-96-8, Niobium oxide 1314-13-2, Zinc oxide, uses 1314-23-4, Zirconium oxide, uses 1314-35-8, Tungsten oxide, uses 1314-61-0, Tantalum oxide 1332-37-2, Iron oxide, uses 1344-28-1, Alumina, uses 1344-70-3, Copper oxide 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-96-5, Manganese, uses 7439-98-7, Molybdenum, uses 7440-02-0, Nickel, uses 7440-03-1, Niobium, uses 7440-32-6, Titanium, uses 7440-44-0, Carbon, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses 7440-66-6, Zinc, uses

7631-86-9, Silicon oxide, uses 11098-99-0, Molybdenum oxide
 11099-02-8, Nickel oxide 11099-11-9, Vanadium oxide 11104-61-3,
 Cobalt oxide 11113-77-2, Palladium oxide 11113-84-1, Ruthenium
 oxide 11118-57-3, Chromium oxide 11129-60-5, Manganese oxide
 11129-89-8, Platinum oxide 12055-23-1, Hafnium oxide 13463-67-7,
 Titania, uses 20667-12-3, Silver oxide
 (particles, **base hydrogen storage**
 alloy particles coated with, for battery anode)

L69 ANSWER 24 OF 28 HCA COPYRIGHT 2004 ACS on STN

107:221733 Manufacture of **fine metal powders.**

Bogdanovic, Borislav; Boennemann, Helmut (Studiengesellschaft Kohle
 m.b.H., Fed. Rep. Ger.). Ger. Offen. DE 3541633 A1 19870527, 6 pp.
 (German). CODEN: GWXXBX. APPLICATION: DE 1985-3541633 19851126.

AB The powders are prep'd. by the reaction of Group 7-12 (IB, IIB, VIIB
 and VIII) metal salts in a solvent, optionally in presence of an
 inorg. support, with Mg contg. a catalytic amt. of anthracene and/or
 Mg anthracene or their alkyl or aryl derivs. The particle size of
 Mg is .ltoreq.0.3 (esp. .ltoreq.0.05 mm), the solvent is THF, and
 the support is SiO₂, Al₂O₃, MgO, **activated C**, or
 excess Mg. The metal powder deposited on the support is used as a
 heterogeneous catalyst, and the metal (Co, Pt, Cr, Fe, and esp. Ni)
 powders alloyed with an excess Mg support are used for **H**
storage. Thus, anthracene (0.36 g, 2 mmol) and 2 drop EtBr
 were added to a suspension of powd. Mg (50 mesh, 0.49 g, 20 mmol) in
 200 mL THF and stirred at .apprx.20.degree. until pptn. of Mg
 anthracene, then NiCl₂ (2.6 g, 20 mmol) was added and the suspension
 was stirred at .apprx.20.degree. for 28 h. A black ppt. was
 filtered, washed 3-5 times with THF, and dried at 10-3 torr to
 obtain 1.56g black pyrophoric powder having sp. surface area 7.2
 m²/g and contg. Ni 78.9, Mg 2.7, C 12.5, H 1.3, and Cl 1.1%.

IT **110633-91-5P**

(catalyst powders, manuf. of, by reducing metal salts with
 magnesium)

RN 110633-91-5 HCA

CN Magnesium alloy, base, Mg 97, Ni 1, H 0.7, C 0.6, Cl 0.2 (9CI) (CA
 INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	97	7439-95-4
Ni	1	7440-02-0
H	0.7	12385-13-6
C	0.6	7440-44-0
Cl	0.2	22537-15-1

IT **110618-29-6P 110618-30-9P 110633-87-9P**

110633-89-1P 110689-35-5P

(manuf. of powd., anthracene-activated magnesium in)

RN 110618-29-6 HCA

CN Nickel alloy, base, Ni 79,C 12,Mg 2.7,H 1.3,Cl 1.1 (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RN 110618-30-9 HCA

CN Iron alloy, base, Fe 78,Mg 11,C 9.4,H 1.2 (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

RN 110633-87-9 HCA

CN Copper alloy, base, Cu 98,Cl 1.6,Mg 0.3 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Cu	98	7440-50-8
Cl	1.6	22537-15-1
Mg	0.3	7439-95-4

RN 110633-89-1 HCA

CN Copper alloy, base, Cu 95,Br 4.2,C 1.3,H 0.4,Mg 0.4 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Cu	95	7440-50-8
Br	4.2	10097-32-2
C	1.3	7440-44-0
H	0.4	12385-13-6
Mg	0.4	7439-95-4

RN 110689-35-5 HCA

CN Cobalt alloy, base, Co 87,C 7,Mg 3.7,Cl 3.5,H 0.8 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Co	87	7440-48-4
C	7	7440-44-0
Mg	3.7	7439-95-4
Cl	3.5	22537-15-1
H	0.8	12385-13-6

IT **110633-90-4P**, Magnesium 99, nickel 1.3
(manuf. of powd., for hydrogen storage)

RN 110633-90-4 HCA

CN Magnesium alloy, base, Mg 99,Ni 1.3 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	99	7439-95-4
Ni	1.3	7440-02-0

IT 1333-74-0P, **Hydrogen**, preparation
(**storage** of, magnesium-nickel alloy powder for, manuf.
of)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H-H

IC ICM B22F009-18

CC 56-4 (Nonferrous Metals and Alloys)

Section cross-reference(s): 52, 67

ST nickel magnesium alloy powder manuf; magnesium anthracene metal
powder manuf; catalyst metal powder manuf; **hydrogen**
storage alloy powder manuf

IT Absorbents

(magnesium-nickel alloy powder for **hydrogen**
storage)

IT 110633-91-5P

(catalyst powders, manuf. of, by reducing metal salts with
magnesium)

IT 120-12-7, Anthracene, uses and miscellaneous 50594-04-2, Magnesium
anthracene

(catalysts, in manuf. of **fine** metal **powders**
by redn. of metal salt with magnesium)

IT 110618-29-6P 110618-30-9P 110633-86-8P

110633-87-9P 110633-88-0P 110633-89-1P

110689-35-5P

(manuf. of powd., anthracene-activated magnesium in)

IT 110633-90-4P, Magnesium 99, nickel 1.3

(manuf. of powd., for hydrogen storage)

IT 1333-74-0P, **Hydrogen**, preparation

(**storage** of, magnesium-nickel alloy powder for, manuf.
of)

L69 ANSWER 25 OF 28 HCA COPYRIGHT 2004 ACS on STN

106:123090 Batteries and amorphous metal alloy anodes for use in acid
environments. Harris, Jonathan H.; Tenhover, Michael A. (Standard
Oil Co., USA). Eur. Pat. Appl. EP 197680 A2 19861015, 20 pp.
DESIGNATED STATES: R: BE, DE, FR, GB, IT, NL, SE. (English).

CODEN: EPXXDW. APPLICATION: EP 1986-301956 19860318. PRIORITY: US 1985-718256 19850401.

AB An acid-electrolyte secondary battery uses an anode of amorphous AaMbM'^c alloy for reversible **H storing**, where A = Pd, Ag, Au, Cu, Hg and/or Pt; M = Pb, Ru, Cr, Mo, Si, W, Ni, Al, Sn, Co, Fe, Zn, Cd, Ga and/or Mn; M' = Ca, Mg, Ti, Y, Zr, Hf, Nb, V, Ta, and/or rare earth metals; a = .apprx.0.005-0.80, b .ltorsim.0.70, and c = .apprx.0.08-0.95. A **H-absorbing** anode of **sputtered** amorphous Pd₁₂Mo₃₀Ti₅₈ alloy was used in a battery with a **graphite** counterelectrode and 2N H₂SO₄ electrolyte. The anode did not show any corrosion throughout .apprx.200 cycles and demonstrated (H:alloy ratio r = 1.1) a charge d. of 444 mA-h/g and 3064 mA-h/cm³. The resp. values for a cryst. Pd control anode (r = 0.55) were 139 mA-h/g and 1668mA-h/cm³.

IT 106607-31-2 106607-32-3 106607-33-4
106607-34-5 106607-36-7 106607-37-8
(**hydrogen-absorbing** amorphous, anodes, for acid-electrolyte batteries)

RN 106607-31-2 HCA

CN Molybdenum alloy, base, Mo 42,Ti 40,Pd 18 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mo	42	7439-98-7
Ti	40	7440-32-6
Pd	18	7440-05-3

RN 106607-32-3 HCA

CN Tungsten alloy, base, W 58,Ti 30,Pd 11 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
W	58	7440-33-7
Ti	30	7440-32-6
Pd	11	7440-05-3

RN 106607-33-4 HCA

CN Titanium alloy, base, Ti 61,Fe 20,Pd 19 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	61	7440-32-6
Fe	20	7439-89-6
Pd	19	7440-05-3

RN 106607-34-5 HCA
 CN Titanium alloy, base, Ti 75,Ni 21,Pd 4.2 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	75	7440-32-6
Ni	21	7440-02-0
Pd	4.2	7440-05-3

RN 106607-36-7 HCA
 CN Tungsten alloy, base, W 45,Ti 41,Ag 13 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
W	45	7440-33-7
Ti	41	7440-32-6
Ag	13	7440-22-4

RN 106607-37-8 HCA
 CN Titanium alloy, base, Ti 64,Mo 24,Cu 12 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	64	7440-32-6
Mo	24	7439-98-7
Cu	12	7440-50-8

IC ICM H01M004-38
 ICS H01M010-34
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 56
 ST **hydrogen storage** battery anode; molybdenum
 titanium alloy hydrogen anode; palladium titanium alloy hydrogen
 anode; titanium amorphous alloy hydrogen anode
 IT Metallic glasses
 (titanium alloys, **hydrogen-absorbing**, anodes,
 for acid-electrolyte batteries)
 IT Anodes
 (battery, **hydrogen-absorbing** amorphous
 titanium alloy, acid-electrolyte)
 IT 106607-31-2 106607-32-3 106607-33-4
 106607-34-5 106607-35-6 106607-36-7 106607-
 37-8 107373-66-0 107373-67-1
 (hydrogen-absorbing amorphous, anodes, for

acid-electrolyte batteries)

L69 ANSWER 26 OF 28 HCA COPYRIGHT 2004 ACS on STN

100:167158 Surface analysis using scattered primary and recoiled secondary neutrals and ions by TOF and ESA techniques. Rabalais, J. Wayne; Schultz, J. Albert; Kumar, Ranjit (Dep. Chem., Univ. Houston, Houston, TX, 77004, USA). Nuclear Instruments & Methods in Physics Research, 218(1-3), 719-26 (English) 1983. CODEN: NIMRD9. ISSN: 0167-5087.

AB A spectrometer system for simultaneous mass, velocity, and energy anal. of scattered and **sputtered** ions and velocity anal. of fast neutrals ejected from a surface by bombardment with a pulsed, mass selected ion beam is described. Combination secondary ion and scattered neutral plus ion time-of-flight (TOF) spectra are presented. Electrostatic sector anal. (ESA) coupled with the TOF technique is used to obtain energy distributions of scattered and **sputtered** ions and TOF/ESA spectra. The neutralization probability of scattered ions, i.e. the fraction of particles surviving a scattering collision as ions, is obtained by collection of spectra of neutrals plus ions and neutrals alone. TOF and ESA spectra are used to illustrate the measurement of particles scattered and **sputtered** by direct recoils and surface recoils. The feasibility of detecting such fast **sputtered** neutrals without postionization is demonstrated. TOF spectra of scattered primary and fast recoiled surface neutrals and ions from selected He+, Ne+, and Ar+ bombardment of CsBr, Ge, GeO₂, H₂O adsorbed on Ge, and clean and adsorbate covered La are presented. Ion fractions are detd. for scattered and recoiled particles and the significance of Auger and resonant neutralization channels is demonstrated. **Adsorbed H** and O are detected by surface recoiling and direct recoiling processes.

IT 7440-44-0, analysis
(detection of adsorbed, on lanthanum, time-of-flight quadrupole mass spectrometric)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IT 7439-91-0, analysis
(surface anal. of, by time-of-flight quadrupole mass spectrometry)

RN 7439-91-0 HCA

CN Lanthanum (8CI, 9CI) (CA INDEX NAME)

La

CC 79-1 (Inorganic Analytical Chemistry)
IT 1333-74-0, analysis 7440-44-0, analysis 7782-44-7,
analysis
(detection of adsorbed, on lanthanum, time-of-flight quadrupole
mass spectrometric)
IT 1310-53-8, analysis 7439-91-0, analysis 7440-56-4,
analysis
(surface anal. of, by time-of-flight quadrupole mass
spectrometry)

L69 ANSWER 27 OF 28 HCA COPYRIGHT 2004 ACS on STN
99:29866 Sorption and electrochemical properties of palladium and
platinum films of different thickness. Rivera Garcia, A. E. (USSR).
Deposited Doc., VINITI 3814-Pt.2-82, 78-81 Avail. VINITI (Russian)
1982.

AB The **adsorption** of H and O and the evolution of H
were studied on thin films of Pt and Pd deposited on glassy C, Ni
and Ti. The films were deposited by an electroless process from
solns. using hydrazine as the reducing agent. The grain size of the
deposited metals was 100-300 .ANG.. The electrochem. measurements
were conducted in 1N H2SO4 and 0.1N NaOH using an earlier described
method. Potentiodynamic curves characterizing the desorption of O
and **adsorption** of H are shown. The special
electrochem. properties of films of Pd and Pt on substrates are
caused to a significant extent by the **small grain**
size. Activation of the substrate under the effect of such films
does not play a decisive role.

IT 1333-74-0, properties
(**adsorption** of, by palladium and platinum films of
different thicknesses)

RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H-H

IT 7440-44-0, uses and miscellaneous
(glassy, sorption and electrochem. properties of palladium and
platinum films of different thickness on)
RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IT 7440-32-6, properties
(sorption and electrochem. properties of palladium and platinum

films on)
RN 7440-32-6 HCA
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

CC 72-2 (Electrochemistry)
Section cross-reference(s): 66, 67

IT Electrolytic polarization
(of **adsorption** of **hydrogen** and desorption of
oxygen on palladium and platinum films of different thickness in
acid and alk. solns.)

IT **Adsorption**
(of **hydrogen**, by palladium and platinum films of
different thicknesses)

IT 1333-74-0, properties
(**adsorption** of, by palladium and platinum films of
different thicknesses)

IT 7440-44-0, uses and miscellaneous
(glassy, sorption and electrochem. properties of palladium and
platinum films of different thickness on)

IT 7440-32-6, properties
(sorption and electrochem. properties of palladium and platinum
films on)

L69 ANSWER 28 OF 28 HCA COPYRIGHT 2004 ACS on STN
92:61047 Separation of granular adsorbents from slurries. Yokota,
Noriyuki; Tokuda, Shingo; Matsushita, Hiroshi; Mada, Shigeo (Osaka
Soda Co., Ltd., Japan). Jpn. Tokkyo Koho JP 54024985 B4 19790824
Showa, 3 pp. (Japanese). CODEN: JAXXAD. APPLICATION: JP
1972-29909 19720325.

AB Slurries contg. Mg(OH)₂ are mixed with ion-exchange resins,
activated C, bone **carbon**, silica gel, or
zeolite to adsorb the heavy metals (e.g., Hg, Fe, Cu, and Cd), and
the mixts. are filtered with a vertical column having holes
smaller than the **granular** adsorbents to sep. the
granular adsorbents from the slurry, and a portion of the filtered
slurry is sprayed tangentially on the filtration surface to prevent
the coagulation. Thus, a slurry contg. Hg 72 ppm, CaSO₄ 5.7, NaCl
17.2, H₂O 71.3, and Mg(OH)₂ 1.9% was mixed with a strongly basic
ion-exchange resin (297-1190 .mu.) for 3 h to
adsorb the Hg. The mixt. was filtered with a vertical
column having 208-.mu. holes to obtain a filtered slurry contg. 1.5
ppm Hg.

IC B01D015-00; B03B005-00
CC 48-1 (Unit Operations and Processes)

=> d 170 1-23 cbib abs hitstr hitind

L70 ANSWER 1 OF 23 HCA COPYRIGHT 2004 ACS on STN

139:222974 Synthesis of carbon **nanotubes** by pyrolysis of acetylene using alloy hydride materials as catalysts and their **hydrogen adsorption** studies. Shaikumon, M. M.; Ramaprabhu, S. (Alternate Energy Technology and Magnetic Materials Laboratory, Department of Physics, Indian Institute of Technology Madras, Chennai, 600 036, India). Chemical Physics Letters, 374(5,6), 513-520 (English) 2003. CODEN: CHPLBC. ISSN: 0009-2614. Publisher: Elsevier Science B.V..

AB The catalytic synthesis of carbon **nanotubes** by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides is discussed. The alloy-hydrides were prepd. using hydrogen decrepitation technique. The samples were purified by acid and heat treatment and were characterized by XRD, BET surface area measurements, SEM, TEM, and Raman spectroscopy. A max. adsorption capacity of 3.3 and 3.1 wt% are obtained at 298 K and 100 bar for carbon **nanotubes** prepd. with Mm-based **AB5** and Zr-based **AB2 hydrogen storage** alloy hydride catalysts, resp.

IT 7440-44-0P, Carbon, preparation
(**nanotubes**; catalytic prepn. of carbon **nanotubes** by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides and **hydrogen storage** properties)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 78-1 (Inorganic Chemicals and Reactions)
Section cross-reference(s): 52, 67

ST carbon **nanotube** prepn acetylene pyrolysis alloy hydride catalyst

IT Catalysts
(**AB2** and **AB5** alloy hydride; catalytic prepn. of carbon **nanotubes** by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides)

IT **Adsorption**
(**hydrogen**; of carbon **nanotubes** prepd. by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides)

IT IR spectra
Surface area

- (of carbon **nanotubes** prep'd. by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides)
- IT 74-86-2, Acetylene, reactions
(catalytic prepn. of carbon **nanotubes** by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides)
- IT 1333-74-0, **Hydrogen**, properties
(**hydrogen storage** properties of carbon **nanotubes** prep'd. by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides)
- IT 7440-44-0P, Carbon, preparation
(**nanotubes**; catalytic prepn. of carbon **nanotubes** by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides and **hydrogen storage** properties)
- L70 ANSWER 2 OF 23 HCA COPYRIGHT 2004 ACS on STN
- 139:182832 AC impedance studies on **AB5** metal hydride electrodes. Begum, S. Nathira; Manimaran, K.; Renganathan, N. G.; Raghavan, M. (Central Electrochemical Research Institute, Karaikudi, 630 006, India). Transactions of the SAEST, 38(2), 89-90 (English) 2003. CODEN: TSETA6. ISSN: 0036-0678. Publisher: Society for Advancement of Electrochemical Science and Technology.
- AB The metal hydride battery is a promising rechargeable battery. The active material in the battery anode is a metal hydride with **H** being **stored** in an alloy. **H-storage** alloys tend oxidize and pulverize in the alk. environment and its ability to **absorb** and desorb **H** is then lost. This study compared the electrochem. characteristics of metal hydride electrodes of varying compn. using electrochem. impedance spectroscopy. The study results are used to develop anodes with the optimum compn., suitable for high-energy applications.
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology) Section cross-reference(s): 72
- IT **Carbon black**, uses
Fluoropolymers, uses
(anode contg.; electrochem. impedance spectroscopy of **AB5** metal hydride anodes for batteries with)
- IT Battery anodes
Electric impedance
(electrochem. impedance spectroscopy of **AB5** metal hydride anodes for batteries)
- IT Hydrides
(electrochem. impedance spectroscopy of **AB5** metal hydride anodes for batteries)

IT 9002-84-0, PTFE 13463-39-3, Nickel carbonyl
(anode contg.; electrochem. impedance spectroscopy of **AB5**
metal hydride anodes for batteries with)

L70 ANSWER 3 OF 23 HCA COPYRIGHT 2004 ACS on STN

139:9260 Electrochemical properties of $\text{MmNi}_{3.6}\text{Co}_{0.7}\text{Al}_{0.3}\text{Mn}_{0.4}$ alloy
containing carbon **nanotubes**. Li, Shang; Pan, Guiling;
Zhang, Ying; Gao, Xueping; Qu, Jingqiu; Yan, Jie; Wu, Feng; Song,
Deying (Institute of New Energy Material Chemistry, Nankai
University, Tianjin, 300071, Peop. Rep. China). Journal of Alloys
and Compounds, 353(1-2), 295-300 (English) 2003. CODEN: JALCEU.
ISSN: 0925-8388. Publisher: Elsevier Science B.V..

AB $\text{MmNi}_{3.6}\text{Co}_{0.7}\text{Al}_{0.3}\text{Mn}_{0.4}$ alloys contg. carbon **nanotubes** were
prepd. by an arc-melting method. A few carbon **nanotubes**
coated or uncoated with **AB5** alloy stuck out of the surface
of the alloy. The effects of the addn. of carbon **nanotubes**
on the structure and the electrochem. characteristics of **AB5**
-type alloy were investigated by XRD and electrochem. measurements.
Discharge plateau curves of sigmoid shape were clearly obsd. for
AB5-CNT electrodes during the initial activation, which was
different from the original **AB5** electrode. With the addn.
of carbon **nanotubes**, the unit cell vol. decreased
resulting in a decrease of the stability of the metal hydride and an
increase in the discharge plateau potential. The discharge capacity
for the alloys decreased with decreasing stability of the metal
hydride due to the decrease of max. amt. of the **absorbed**
hydrogen, but the high-rate dischargeability was improved
due to the increase in the rate of hydrogen diffusion in the alloys.
The capacity retaining ability of the alloys did not remarkably
decrease with the addn. of carbon **nanotubes**.

IT 7440-44-0, Carbon, processes
(**nanotubes**; electrochem. properties of
 $\text{MmNi}_{3.6}\text{Co}_{0.7}\text{Al}_{0.3}\text{Mn}_{0.4}$ alloy contg. carbon **nanotubes**)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **hydrogen storage** carbon **nanotubes**
AB5 type alloy

IT 1333-74-0, Hydrogen, processes 156180-55-1
(electrochem. properties of $\text{MmNi}_{3.6}\text{Co}_{0.7}\text{Al}_{0.3}\text{Mn}_{0.4}$ alloy contg.
carbon **nanotubes**)

IT 7440-44-0, Carbon, processes
(**nanotubes**; electrochem. properties of
 $\text{MmNi}_{3.6}\text{Co}_{0.7}\text{Al}_{0.3}\text{Mn}_{0.4}$ alloy contg. carbon **nanotubes**)

L70 ANSWER 4 OF 23 HCA COPYRIGHT 2004 ACS on STN

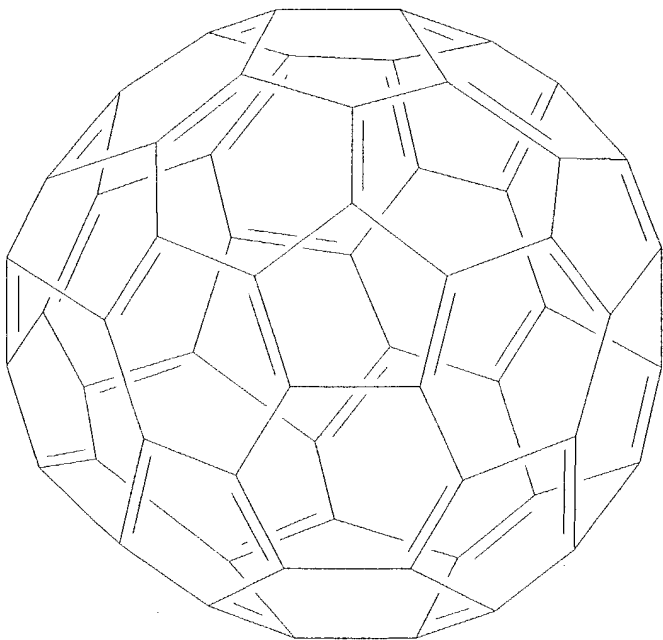
137:203878 Electrochemical **hydrogen storage** into LaNi₅ using a **fullerene**-based proton conductor. Maruyama, Ryuichiro (Frontier Science Laboratories, Sony Corporation, Yokohama, 240-0036, Japan). Electrochemical and Solid-State Letters, 5(5), A89-A91 (English) 2002. CODEN: ESLEF6. ISSN: 1099-0062. Publisher: Electrochemical Society.

AB Hydrogen was electrochem. compressed using the membrane electrode assembly (MEA) film of hydrogen sulfated **fullerenol** [C₆₀(OSO₃H)_n(OH)_n]. The material works as proton conductor without further humidification at ambient temp. Hydrogen was compressed up to 1 MPa using one MEA. The amt. of compressed hydrogen and the potential to compress hydrogen followed the Faraday's law and Nernst equation. Thus, the storage of the electrochem. compressed hydrogen in an **AB5**-type alloy was confirmed.

IT **99685-96-8D, Fullerene** (C₆₀), hydrogen sulfated derivs.
(proton conductor; electrochem. **hydrogen** compression and **storage** into LaNi₅ using a **fullerene**-based proton conductor)

RN 99685-96-8 HCA

CN [5,6]Fullerene-C₆₀-1h (9CI) (CA INDEX NAME)



IT 1333-74-0, **Hydrogen**, processes
(**storage**; electrochem. **hydrogen** compression)

and **storage** into LaNi5 using a **fullerene**
-based proton conductor)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H-H

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **hydrogen** electrochem compression **storage**
lanthanum nickel; proton conductor lanthanum nickel **hydrogen**
storage compression; **fullerene** hydrogen sulfate
lanthanum nickel **hydrogen storage**

IT Compression
(electrochem.; electrochem. **hydrogen** compression and
storage into LaNi5 using a **fullerene**-based
proton conductor)

IT **Fullerenes**
(hydrogen sulfate derivs., proton conductor; electrochem.
hydrogen compression and **storage** into LaNi5
using a **fullerene**-based proton conductor)

IT Ionic conductors
(proton; electrochem. **hydrogen** compression and
storage into LaNi5 using a **fullerene**-based
proton conductor)

IT 12196-72-4, Lanthanum, compd. with nickel (1:5)
(**hydrogen storage** alloy; electrochem.
hydrogen compression and **storage** into LaNi5
using a **fullerene**-based proton conductor)

IT 99685-96-8D, **Fullerene** (C60), hydrogen sulfated
derivs.
(proton conductor; electrochem. **hydrogen** compression
and **storage** into LaNi5 using a **fullerene**
-based proton conductor)

IT 1333-74-0, **Hydrogen**, processes
(**storage**; electrochem. **hydrogen** compression
and **storage** into LaNi5 using a **fullerene**
-based proton conductor)

L70 ANSWER 5 OF 23 HCA COPYRIGHT 2004 ACS on STN

136:312404 Properties of pellet- and paste-type electrodes of
AB5 hydrogen storage alloy. Park,
Choong-Nyeon; Lee, Ho-Jun; Jung, So-Ri (Department of Metallurgical
Engineering, Chonnam National University, Kwangju, 500-757, S.
Korea). Journal of Alloys and Compounds, 330-332, 821-824 (English)
2002. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science
S.A..

AB The discharge capacities of pellet- and paste-type **AB5**

alloy electrodes were investigated. The $\text{LaNi}_{3.6}\text{Al}_{0.4}\text{Co}_{0.7}\text{Mn}_{0.3}$ alloy was chosen and the alloy powder was coated with various amts. of copper by the electroless plating method. The pellet-type electrodes were fabricated by cold pressing the copper-coated alloy powder into disks of 10 mm diam. without any binding material and the paste-type electrodes were prepd. by pasting the bare or the copper-coated alloy powders onto the foamed nickel with some org. binders. The discharge capacities of the electrodes were measured through half cell tests. The exptl. results showed that for the pellet-type electrodes, as the amt. of copper coat increased the discharge capacity per wt. of electrode decreased whereas that per wt. of alloy increased. For the paste-type electrodes the copper coated alloy powder showed a much higher discharge capacity than the bare alloy powder. However, the increase of the copper coat over a certain amt. did not increase the discharge capacity per wt. of alloy while decreasing that per wt. of electrode. Considering the discharge capacity and mech. endurance, the most promising electrode was the paste-type electrode with 2.5 wt.% Cu-coated alloy powder and no **carbon black**.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST battery anode **AB5** type alloy

IT Battery anodes

(properties of pellet- and paste-type electrodes of **AB5**
hydrogen storage alloy)

IT 156186-74-2

(properties of pellet- and paste-type electrodes of **AB5**
hydrogen storage alloy)

L70 ANSWER 6 OF 23 HCA COPYRIGHT 2004 ACS on STN

135:306316 Fuel cell system comprising adsorption device for the removal of gas components. Klein, Christian; Schuessler, Martin (Xcellsis G.m.b.H., Germany). Eur. Pat. Appl. EP 1148568 A2 20011024, 6 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (German). CODEN: EPXXDW. APPLICATION: EP 2001-108595 20010405. PRIORITY: DE 2000-10019772 20000420.

AB The variations in concn. of gas components in fuel gas flows of fuel cell systems are regulated by an adsorption device. The adsorption device adsorbs the gas component under an increased partial pressure, and releases the gas component exposed to a decreased partial pressure. The adsorption device is placed in the fuel gas conduit, between the reformer (gas generation) and the oxidn. catalyst (gas purifn.), whereby CO, water vapor, and **H2** can be **adsorbed**. The adsorption material contains CuY, CuZSM-5, **activated carbon**, Al_2O_3 , silica gel, zeolites, or an alloy, which is selected from AB, **AB2**, **A2B**, **AB5**; A = Mg, Ca, Ti, Zr, V, or La; B = Mn, Fe, Co, Ni, or Cu.

IT 7440-44-0, **Activated carbon**, uses
(**activated**; fuel cell system comprising adsorption
device for the removal of gas components)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IC ICM H01M008-04

ICS H01M008-06

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell carbon monoxide **hydrogen adsorption**

IT 7440-44-0, **Activated carbon**, uses
(**activated**; fuel cell system comprising adsorption
device for the removal of gas components)

L70 ANSWER 7 OF 23 HCA COPYRIGHT 2004 ACS on STN

135:275229 **Hydrogen absorption** characteristics and
electrochemical properties of Ti substituted Zr-based **AB2**
alloys. Visintin, A.; Peretti, H. A.; Tori, C. A.; Triaca, W. E.
(Facultad de Ciencias Exactas, Instituto de Investigaciones
Fisicoquimicas Teoricas y Aplicadas, Universidad Nacional de La
Plata, La Plata, 1900, Argent.). International Journal of Hydrogen
Energy, 26(7), 683-689 (English) 2001. CODEN: IJHEDX. ISSN:
0360-3199. Publisher: Elsevier Science Ltd..

AB The **hydrogen absorption** characteristics of
Zr_{1-x}Ti_xCrNi alloys, with x ranging between 0.1 and 0.4, were
studied by volumetric and electrochem. techniques in order to det.
their possible application as the neg. electrode in
nickel/metal-hydride rechargeable batteries. Electrodes of alloy
powders mixed with different compacting additives were tested with
respect to charge and discharge cycles in KOH soln. The effects of
the electrode-compacting additive, discharge rate and temp. on the
electrode discharge capacity were also investigated. The results
obtained show that: (i) at 80.degree.C the equil. pressures of
Zr_{1-x}Ti_xCrNi alloys with x=0.1 are 2.6 times higher than those for
the unsubstituted ZrCrNi alloy, while maintaining a good
hydrogen storage capacity; (ii) the Zr_{0.9}Ti_{0.1}CrNi
alloy electrodes exhibit the highest discharge capacities and the
best performances during fast charge-discharge cycling; (iii) the Ti
substituted alloy electrodes using copper powder as compacting
material show faster **activation**, while **carbon**
-Teflon compacted electrodes exhibit the best cycle life behavior;
(iv) for all Ti substituted alloy electrodes the discharge
capacities increase with temp.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT **Absorption**

Battery cathodes

Secondary batteries

(**hydrogen absorption** characteristics and electrochem. properties of Ti substituted Zr-based **AB2** alloys)

IT 1333-74-0, **Hydrogen**, processes 168018-65-3 221335-84-8
282731-85-5 362531-81-5

(**hydrogen absorption** characteristics and electrochem. properties of Ti substituted Zr-based **AB2** alloys)

L70 ANSWER 8 OF 23 HCA COPYRIGHT 2004 ACS on STN

135:244903 The performances of proto-type Ni/MH secondary batteries using Zr-based **hydrogen storage** alloys and filamentary type Ni. Lee, Sang-Min; Lee, Ho; Kim, Jin-Ho; Lee, Paul S.; Lee, Jai-Young (Department of Material Science and Engineering, Korea Advanced Institute of Science and Technology, Taejon, 305-701, S. Korea). Metals and Materials International, 7(2), 181-186 (English) 2001. CODEN: MMIECY. Publisher: Korean Institute of Metals and Materials.

AB For the purpose of developing a Zr-based Laves phase alloy with higher capacity and better performance for electrochem. application, extensive work has been carried out. After careful alloy design of ZrMn₂-based **hydrogen storage** alloys through varying their stoichiometry by means of substituting or adding alloying elements, the Zr_{0.9}Ti_{0.1}(Mn_{0.7}V_{0.5}Ni_{1.4})_{0.92} with high capacity (392 mAh/g at the 0.25C) and improved performance (comparable to that of commercialized **AB5** type alloy) was developed. Another endeavor was made to improve the poor activation property and the low rate capability of the developed Zr-based Laves phase alloy for commercialization. The combination method of hot-immersion and slow-charging was introduced. It was found that electrode activation was greatly improved after hot immersion at 80.degree.C for 12 h followed by charging at 0.05C. The effects of this method are discussed in comparison with other activation methods. The combination method was successfully applied to the formation process of 80 Ah Ni/MH cells. A series of systematic investigations has been rendered to analyze the inner cell pressure characteristics of a sealed type Ni-MH battery. It was found that the increase of inner cell pressure in the sealed type Ni/MH battery of the above-mentioned Zr-Ti-Mn-V-Ni alloy was mainly due to the accumulation of oxygen gas during charge/discharge cycling. The fact identified that the surface catalytic activity was affected more dominantly by the oxygen recombination reaction than the reaction surface area was also identified. In order to improve the surface catalytic activity of a Zr-Ti-Mn-V-Ni alloy, which is closely related to the inner pressure behavior in a sealed cell, the electrode was fabricated by mixing the alloy with Cu powder and a

- filamentary type of Ni and replacing 75% of the **carbon black** with them; thus, the inner cell pressure rarely increases with cycles due to the active gas recombination reaction. Measurements of the surface area of the electrode and the surface catalytic activity showed that the surface catalytic activity for the oxygen recombination reaction was greatly improved by the addn. of Cu powder and the filamentary type of Ni. Finally, we have collaborated with Hyundai Motors Company on fabrication of the 80 Ah cells for Elec. Vehicles and evaluated the cell performance.
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 72
- ST nickel metal hydride battery zirconium alloy anode; **hydrogen storage** zirconium alloy anode
- IT Battery anodes
Secondary batteries
(performances of proto-type nickel-metal hydride secondary batteries using Zr-based **hydrogen storage** alloys and filamentary type Ni)
- IT 360559-18-8
(performances of proto-type nickel-metal hydride secondary batteries using Zr-based **hydrogen storage** alloys and filamentary type Ni)
- IT 1333-74-0, Hydrogen, processes
(performances of proto-type nickel-metal hydride secondary batteries using Zr-based **hydrogen storage** alloys and filamentary type Ni)
- L70 ANSWER 9 OF 23 HCA COPYRIGHT 2004 ACS on STN
135:229248 Effect of nickel, cobalt or **graphite** addition on the electrochemical properties of an **AB5 hydrogen storage** alloy and their mechanism. Yuan, A.; Xu, N. (Shanghai Institute of Metallurgy, Chinese Academy of Sciences, Shanghai, 200050, Peop. Rep. China). Journal of Alloys and Compounds, 322(1-2), 269-275 (English) 2001. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science S.A..
- AB The effects of the addn. of cobalt powder, nickel powder and **graphite** to metal hydride (MH) electrode have been investigated by using the const. current charge/discharge test. Electrochem. impedance spectroscopy, linear polarization and cyclic voltammetry methods were used to study the mechanism for the property variation. Cobalt powder addn. can increase the MH electrode capacity at lower charge/discharge rates, but decrease the capacity at higher charge/discharge rates. Nickel powder addn. is beneficial to the capacity and rate-discharge-ability due to the improvement of elec. conductance and electrocatalytic activity of the MH electrode. The performance of the MH electrode is slightly improved with the addn. of **graphite**. The lower-frequency semicircle obsd. in the Nyquist plot is suggested to be the reaction

impedance of the MH electrode.

IT 7782-42-5, **Graphite**, processes
(effect of nickel, cobalt or **graphite** addn. on the
electrochem. properties of an **AB5 hydrogen**
storage alloy and their mechanism)
RN 7782-42-5 HCA
CN Graphite (8CI, 9CI) (CA INDEX NAME)

C

IT 1333-74-0, **Hydrogen**, processes
(**storage**,; effect of nickel, cobalt or **graphite**
addn. on the electrochem. properties of an **AB5**
hydrogen storage alloy and their mechanism)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H-H

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST metal hydride electrode nickel cobalt **graphite**
hydrogen storage

IT Electrodes
Storage
(effect of nickel, cobalt or **graphite** addn. on the
electrochem. properties of an **AB5 hydrogen**
storage alloy and their mechanism)

IT Hydrides
(effect of nickel, cobalt or **graphite** addn. on the
electrochem. properties of an **AB5 hydrogen**
storage alloy and their mechanism)

IT 7440-02-0, **Nickel**, processes 7440-48-4, **Cobalt**, processes
7782-42-5, **Graphite**, processes 189453-81-4
(effect of nickel, cobalt or **graphite** addn. on the
electrochem. properties of an **AB5 hydrogen**
storage alloy and their mechanism)

IT 1333-74-0, **Hydrogen**, processes
(**storage**,; effect of nickel, cobalt or **graphite**
addn. on the electrochem. properties of an **AB5**
hydrogen storage alloy and their mechanism)

L70 ANSWER 10 OF 23 HCA COPYRIGHT 2004 ACS on STN

134:313531 Carrying clean energy to the future - **hydrogen**
absorbing materials. Bououdina, M.; Guo, Z. X. (Department
of Materials, University of London, London, E1 4NS, UK). Materials
Technology (Poulton-le-Fylde, United Kingdom), 15(4), 269-275

(English) 2000. CODEN: MATTEI. ISSN: 1066-7857. Publisher: Matrice Technology Ltd..

AB A review with no refs. This report outlines the pros and cons and promises of the title materials, with an aim of providing a balanced view of this rapidly developing technol. Details are given on: (1) metal, alkali metal, rare earth and alkali rare earth hydrides; (2) FeTi intermetallic compd.; (3) LaNi₅ and related compds.; (4)

AB2 Laves phases; (5) **H storage** in quasicrystals; (6) sodium alanate and related hydrides; (7) Mg and Mg₂Ni based hydrides; (8) single walled carbon **nanotubes** as potential **H storage** materials for elec. vehicles; (9) rare earth metals and related compds; (10) zeolites; (11) specific technol. applications; (12) operation of Ni-metal hydride batteries; and (13) comparison of MH electrodes of com. batteries.

CC 52-0 (Electrochemical, Radiational, and Thermal Energy Technology) Section cross-reference(s): 56

ST review **hydrogen absorbing** material

IT Energy
Materials

(**hydrogen absorbing** materials for clean energy to future)

IT Alloys, uses
Hydrides

Intermetallic compounds

(**hydrogen absorbing** materials for clean energy to future)

IT 1333-74-0, **Hydrogen**, uses

(**hydrogen absorbing** materials for clean energy to future)

L70 ANSWER 11 OF 23 HCA COPYRIGHT 2004 ACS on STN

134:74841 **Hydrogen storage** alloy/carbon nanometer tube composite **hydrogen storage** material. Gao, Xueping; Qin, Xue; Wu, Feng; Ye, Shihai; Liu, Hong; Yuan, Huatang; Song, Deying; Shen, Panwen (Nankai Univ., Peop. Rep. China). Faming Zhuanli Shenqing Gongkai Shuomingshu CN 1259584 A 20000712, 5 pp. (Chinese). CODEN: CNXXEV. APPLICATION: CN 2000-100505 20000120.

AB The **hydrogen storage** material is composed of 1-90% **H-storage** alloy and 10-99% C

nanotubes. The **H-storage** alloy is

AB5-type alloy LN_n-x-y-zCo_xNyM_z (L = rare earth mixt., La, Ce, Nd, Pr, or Y; N and/or M = Mn, V, Cr, Al, Fe, Cu, Zn, or Sn; n = 4-6; x, y, and/or z = 0-2), Laves **AB2**-type alloy KN_a-b-c-dVbGcJd (K = Zr, Ti, Hf, rare earth mixt., La, Ce, Nd, Pr, or Y; G and/or J = Co, Mn, Cr, Al, Fe, Cu, Zn, or Sn; a = 1.2-2.8; b, c, and/or d = 0-2), AB-type alloy HN_m-k-jFekPj (H = Zr or Hf; P = Co, Mn, V, Cr, Al, Cu, Zn, or Sn; m = 0.6-1.5; k = 0-1.5; and j =

0-1); and/or **A2B**-type alloy $\text{Mgg-fEfNil-p-qCopTq}$ ($E = \text{Ca, Zr, Ti, Hf, rare earth mixt., La, Ce, Nd, Pr, or Y; T = Mn, V, Cr, Al, Fe, Cu, Zn, or Sn; g} = 0.8-2.5; f = 0-1; \text{ and p and/or q} = 0-0.6$). The **H-storage** material is manufd. by:
 (1) passing a reactive gas ($\text{CH}_4, \text{C}_2\text{H}_4$, etc.) through a sensitized powd. (particle diam. 10-20 μm) catalyst ($\text{LaNi}_{4.5}\text{Fe}_{0.5}, \text{Mg}_2\text{Ni}$, etc.) in a stationary bed at 723-1273.degree.K for 10-70 min, (2) passing the reactive gas through a powd. precursor of a metal catalyst in a stationary bed and allowing the prepd. composite to react with CaH_2 or Ca in flowing Ar at 973-1273.degree.K for 1-5 h, or (3) milling a powd. **H-storage** alloy and C **nanotubes** in an aq. soln. contg. .ltoreq.2M F-.

IC C22C019-03

CC 56-4 (Nonferrous Metals and Alloys)
 Section cross-reference(s): 52

ST **hydrogen storage** alloy carbon **nanotube**
 composite

IT Composites

Nanotubes

(**hydrogen storage** alloy/carbon nanometer tube
 composites for **hydrogen storage**)

IT 12057-65-7 109077-91-0 316167-05-2 316167-06-3

(compn.; **hydrogen storage** alloy/carbon
 nanometer tube composites for **hydrogen storage**
)

IT 1333-74-0, **Hydrogen**, processes

(**hydrogen storage** alloy/carbon nanometer tube
 composites for **hydrogen storage**)

IT 316167-04-1

(**hydrogen storage** alloy/carbon nanometer tube
 composites for **hydrogen storage**)

L70 ANSWER 12 OF 23 HCA COPYRIGHT 2004 ACS on STN

133:337608 Electrochemical investigation of single-walled carbon
nanotubes for **hydrogen storage**.

Rajalakshmi, N.; Dhathathreyan, K. S.; Govindaraj, A.; Satishkumar,
 B. C. (Guindy, 111 Mount Road, Centre for Electrochemical and Energy
 Research, SPIC Science Foundation, Madras, 600032, India).
 Electrochimica Acta, 45(27), 4511-4515 (English) 2000. CODEN:
 ELCAAV. ISSN: 0013-4686. Publisher: Elsevier Science Ltd..

AB Electrodes made of purified and open single walled carbon
nanotubes behave like metal hydride electrodes in Ni-MH
 batteries, showing high electrochem. reversible charging capacity up
 to 800 mAh g⁻¹ corresponding to a **hydrogen storage**
 capacity of 2.9 wt% compared to known **AB5**, **AB2**
 metal hydride electrodes.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 72

ST carbon **nanotubes hydrogen storage**
IT **Nanotubes**
(carbon; electrochem. investigation of single-walled carbon **nanotubes for hydrogen storage**)
IT Electric charge
(charge-discharge of single-walled carbon **nanotubes electrodes for hydrogen storage**)
IT **Storage**
(**hydrogen**; electrochem. investigation of single-walled carbon **nanotubes for hydrogen storage**)
IT Electric capacitance
(of single-walled carbon **nanotubes electrodes for hydrogen storage**)
IT 1333-74-0, Hydrogen, properties
(electrochem. investigation of single-walled carbon **nanotubes for hydrogen storage**)

L70 ANSWER 13 OF 23 HCA COPYRIGHT 2004 ACS on STN
132:95684 Influence of carbon on electrode properties of V-Ti-Ni type **hydrogen storage** alloy. Shi, Jun; Tsukahara, Makoto; Takeshita, Hiroyuki T.; Kuriyama, Nobuhiro; Sakai, Tetsuo (New Energy and Industrial Technology Development Organization, Tokyo, 170-6028, Japan). Journal of Alloys and Compounds, 293-295, 716-720 (English) 1999. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science S.A..
AB Influences of carbon on microstructure and electrode properties were investigated for battery alloy V4TiNi0.65Co0.05Nb0.047Ta0.047. With increasing carbon concn., the cycle-life of charge/discharge became longer. One of main factors that affected the cycle-life was the expansion and redn. of the (Ti,V)-based solid soln. phase. Cracks yielded in TiNi phase more easily than in other phases. V-based battery alloys were more hardly pulverized than **AB5** and **AB2** intermetallic compd. type materials.
IT **7440-44-0**, Carbon, uses
(influence of carbon on electrode properties of V-Ti-Ni type **hydrogen storage** alloy)
RN **7440-44-0** HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology) Section cross-reference(s): 56
ST battery anode **hydrogen storage** alloy; vanadium titanium nickel anode hydriding; carbon effect vanadium titanium nickel alloy hydriding

- IT Battery anodes
Hydriding
Microstructure
(influence of carbon on electrode properties of V-Ti-Ni type
hydrogen storage alloy)
- IT 223438-70-8
(influence of carbon on electrode properties of V-Ti-Ni type
hydrogen storage alloy)
- IT 7440-44-0, Carbon, uses
(influence of carbon on electrode properties of V-Ti-Ni type
hydrogen storage alloy)
- IT 1333-74-0, Hydrogen, uses
(influence of carbon on electrode properties of V-Ti-Ni type
hydrogen storage alloy)

L70 ANSWER 14 OF 23 HCA COPYRIGHT 2004 ACS on STN

131:274163 Electrochemical segregation of the fluorinated **AB2** electrode during cycling. Toyoda, Eiji; Gao, Xueping; Sun, Yuanming; Nakajima, Tadaaki; Suda, Seijirau (Grad. Sch. Ind. Chem., Kogakuin Univ., Tokyo, 163-8677, Japan). Kogakuin Daigaku Kenkyu Hokoku, 86, 77-80 (Japanese) 1999. CODEN: KDKHAY. ISSN: 0368-5098. Publisher: Kogakuin Daigaku.

AB Improvement of the initial **activation** and electrochem. C/D cycle life of the Laves-phase **AB2** alloy are of basic importance for the application of hydriding alloy to Ni/MH batteries which exhibit larger discharge capacity than discharge capacity of **AB5**. Fluorination treatment used here was very effective for improving the initial activation and the max. discharge capacity of Laves-phase alloy by the redn. of metallic Ni. Exptl. anal. on the deterioration mechanism of the electrode was performed by an electrochem. impedance spectra, XRD, and ICP. After cycling, the alloy bulk still remained a capability of hydrogen by XRD anal., and the deterioration mechanism of the Laves-phase electrode was mainly considered to be surface process. In particular, the particle pulverization was made by increasing the sp. surface area obtained by BET, and by reducing the particle size obsd. by SEM. This pulverization was identified to be a main reason for causing deterioration of the electrode. Furthermore, the particle pulverization further increased the dissoln. rate of V and Mn, which was proportional to the sp. surface area by generating new fresh surface. The structure of the alloy surface layer destroyed by the particle pulverization and dissoln. of V and Mn contributed to the deterioration of Laves-phase electrode.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST battery anode **hydrogen absorbing** alloy;
zirconium nickel alloy anode hydriding

IT Battery anodes

Hydriding

Secondary batteries

(electrochem. segregation of fluorinated **AB2** electrode during battery cycling)

IT 147301-31-3

(electrochem. segregation of fluorinated **AB2** electrode during battery cycling)

IT 1333-74-0, Hydrogen, uses

(electrochem. segregation of fluorinated **AB2** electrode during battery cycling)

L70 ANSWER 15 OF 23 HCA COPYRIGHT 2004 ACS on STN

131:105400 **Hydrogen-absorbing** material composition

suitable for battery anode. Suda, Seijirou (Hydrogen Energy Kenkyujo K. K., Japan). Jpn. Kokai Tokkyo Koho JP 11181536 A2 19990706 Heisei, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1997-353908 19971222.

AB The compn. comprises (a) a fluorinated **AB2-**, **AB-**, and/or BCC-type **H-absorbing** Ni-contg. alloy and (b) a fluorinated **AB5-type H-absorbing**

Ni-contg. alloy. The compn. may contain fluorinated **carbon black**. The compn., suitable for a battery anode, has high H activity, excellent hydrogenation and electrochem. properties, long life, and high durability.

IC ICM C22C019-00

ICS B22F001-02; H01M004-24; H01M004-38

CC 56-3 (Nonferrous Metals and Alloys)

Section cross-reference(s): 52

ST **hydrogen absorbing** nickel alloy fluorinated compn; battery anode **hydrogen absorbing** alloy compn; **carbon black hydrogen absorbing** alloy fluorinated

IT Battery anodes

Fluorination

(fluorinated **hydrogen-absorbing** alloy compn. suitable for battery anode)

IT **Carbon black**, uses

(fluorinated, alloy compn. contg.; fluorinated **hydrogen -absorbing** alloy compn. suitable for battery anode)

IT Alloys, uses

(nickel-contg., **hydrogen-absorbing**, fluorinated; fluorinated **hydrogen-absorbing** alloy compn. suitable for battery anode)

IT 1333-74-0, **Hydrogen**, miscellaneous

(alloys **absorbing**; fluorinated **hydrogen-absorbing** alloy compn. suitable for battery anode)

IT 82089-05-2D, fluoride 193678-39-6D, fluoride

(fluorinated **hydrogen-absorbing** alloy compn.)

- suitable for battery anode)
- IT 7789-23-3, Potassium fluoride
(fluorinating agent; fluorinated **hydrogen-
absorbing** alloy compn. suitable for battery anode)
- L70 ANSWER 16 OF 23 HCA COPYRIGHT 2004 ACS on STN
131:104486 Effect of carbon additives on the electrochemical properties
of **AB5 graphite** composite electrodes prepared by
mechanical milling. Aymard, L.; Lenain, C.; Courvoisier, L.;
Salver-Disma, F.; Tarascon, J-M. (Laboratoire de Reactivite et de
Chimie des Solides, Universite de Picardie Jules Verne, Amiens,
80039, Fr.). Journal of the Electrochemical Society, 146(6),
2015-2023 (English) 1999. CODEN: JESOAN. ISSN: 0013-4651.
Publisher: Electrochemical Society.
- AB The effect of mech. milling on powder mixts. consisting of
graphite and **AB5** alloys, prepd. either by mech.
alloying or by a high-temp. melting process, has been investigated.
The resulting hydride-forming composite electrodes show a 10 and 40%
capacity enhancement for arc-melted and mech. prepd. **AB5**
alloys, resp. Such an increase in capacity is suggested to be the
result of several cumulative effects: (1) a mech. induced reducing
role of **graphite** which eliminates the **AB5**
particles of oxide coatings, enabling a better **hydrogen
adsorption/absorption** and diffusion into the
insertion sites of the alloy, (2) the appearance of an increasingly
important double-layer capacitance on each particle with increased
milling time that adds to the faradaic component, and (3) the
improved electronic cond. between the active **AB5** material
and the **graphite** that allows a better utilization of the
alloy.
- IT 7782-42-5, Graphite, uses
(effect of carbon additives on electrochem. properties of
AB5 graphite composite electrodes prepd. by
mech. milling)
- RN 7782-42-5 HCA
CN Graphite (8CI, 9CI) (CA INDEX NAME)
- C
- IT 7440-44-0, Carbon, uses
(effect of carbon additives on electrochem. properties of
AB5 graphite composite electrodes prepd. by
mech. milling)
- RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 56

ST battery anode alloy **graphite** composite; carbon additive
effect battery anode

IT Battery anodes
(effect of carbon additives on electrochem. properties of
AB5 graphite composite electrodes prepd. by
mech. milling)

IT Machining
(milling; effect of carbon additives on electrochem. properties
of **AB5 graphite** composite electrodes prepd.
by mech. milling)

IT 7782-42-5, **Graphite**, uses
(effect of carbon additives on electrochem. properties of
AB5 graphite composite electrodes prepd. by
mech. milling)

IT 7440-44-0, Carbon, uses
(effect of carbon additives on electrochem. properties of
AB5 graphite composite electrodes prepd. by
mech. milling)

IT 231607-37-7
(effect of carbon additives on electrochem. properties of
AB5 graphite composite electrodes prepd. by
mech. milling)

IT 1333-74-0, Hydrogen, uses
(effect of carbon additives on electrochem. properties of
AB5 graphite composite electrodes prepd. by
mech. milling)

L70 ANSWER 17 OF 23 HCA COPYRIGHT 2004 ACS on STN

130:314335 Electrochemical properties of $\text{Zr}(\text{VxNi}_{1-x})_3$ as electrode
material in nickel-metal hydride batteries. Chartouni, Daniel;
Zuttel, Andreass; Nutzenadel, Christoph; Gross, Karl; Schlapbach,
Louis; Guther, Volker; Otto, Andreas (Institute of Physics,
University of Fribourg, Fribourg, CH-1700, Switz.). International
Journal of Hydrogen Energy, 24(2/3), 229-233 (English) 1999. CODEN:
IJHEDX. ISSN: 0360-3199. Publisher: Elsevier Science Ltd..

AB Zr-V-Ni based alloys represent one group of alloys with promising
properties for the use as **hydrogen absorbing**
electrodes in an alk. electrolyte. In particular, this group has
been studied because these alloys are effective in overcoming the
energy d. limitations of present **AB5** type alloys. We have
investigated the alloys $\text{Zr}(\text{VxNi}_{1-x})_3$ in the range 0.29 .ltoreq. x
.ltoreq. 0.5 by means of SEM with electron probe X-Ray microanal.,

X-ray diffraction and electrochem. measurements. The alloys are composed of different crystallog. phases. The main phase (a C15 Laves phase, space group $Fd\bar{3}m$) consists of all three elements and was found to be responsible for the high reversible capacity of a max. of 375 mAh/g. The second phase is vanadium-nickel

based (b.c.c. structure, space group:

$Im\bar{3}m$). The discharge kinetics of this alloys was investigated in electrochem. expts. We obsd. an increase of the high rate dischargeability with increasing nickel content. This is mainly due to the catalytic effect of nickel for the **hydrogen**

absorption-desorption process. The exchange c.d. increases with increasing nickel content. Furthermore, we obsd. a faster activation for the alloys with higher nickel content.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology) Section cross-reference(s): 56

ST battery anode **hydrogen absorption** alloy;
zirconium vanadium nickel alloy anode battery

L70 ANSWER 18 OF 23 HCA COPYRIGHT 2004 ACS on STN

127:250500 Effect of additives to **AB5** alloys and of cell configuration on the performance of hydride electrodes. Visintin, Arnaldo; Smith, Dustin; Gamboa-Aldeco, Maria; Srinivasan, Supramaniam (Instituto Nacional de Investigaciones Fisicoquimica Teoricas y Aplicadas (INIFTA), Universidad Nacional de La Plata, La Plata, 1900, Argent.). Proceedings - Electrochemical Society, 97-18 (Batteries for Portable Applications and Electric Vehicles), 780-786 (English) 1997. CODEN: PESODO. ISSN: 0161-6374. Publisher: Electrochemical Society.

AB The effect of carbon and nickel additives to the electrode on the electrochem. performance of a Ni-MHx alloy of the **AB5** type ($MmNi_{4.1}Co_{0.4}Mn_{0.4}Al_{0.3}$) is studied. Carbon with high microporosity such as Vulcan XC72, shows better discharge capacity of the electrode as compared to a carbon with low surface area, due to a better distribution of reactants in the hydriding/dehydriding reactions. Hydrophilicity of the carbon binder plays also an important role in the performance of the electrode. Electrodes treated with a wetting agent show larger discharge capacity as compared to those electrodes made with hydrophobic carbon. Addn. of high surface area Ni powder to the electrode improves its performance, possibly due to an increase of the electrocatalytic activity of the electrode for the water discharge step of the dehydriding reaction, and this effect increases with the amt. of nickel powder added to the electrode. Mech. compression of the electrode minimizes its phys. degrdn. during the charge/discharge cycles, and therefore improves its cyclic life performance.

IT 1333-74-0, **Hydrogen**, processes

(**storage** of; effect of nickel and carbon additives to **AB5** alloys and of cell configuration on the performance

of hydride electrodes)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H--H

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 76

IT Fluoropolymers, uses
(**carbon black** contg.; effect of nickel and
carbon additives to **AB5** alloys and of cell
configuration on the performance of hydride electrodes)

IT Battery anodes
Secondary batteries
(effect of nickel and carbon additives to **AB5** alloys
and of cell configuration on the performance of hydride
electrodes)

IT **Carbon black**, uses
(effect of nickel and carbon additives to **AB5** alloys
and of cell configuration on the performance of hydride
electrodes)

IT 9002-84-0, Teflon
(**carbon black** contg.; effect of nickel and
carbon additives to **AB5** alloys and of cell
configuration on the performance of hydride electrodes)

IT 7440-02-0, Nickel, uses 195616-33-2
(effect of nickel and carbon additives to **AB5** alloys
and of cell configuration on the performance of hydride
electrodes)

IT 1333-74-0, **Hydrogen**, processes
(**storage** of; effect of nickel and carbon additives to
AB5 alloys and of cell configuration on the performance
of hydride electrodes)

L70 ANSWER 19 OF 23 HCA COPYRIGHT 2004 ACS on STN

124:186306 **Hydrogen absorption** mechanism of
La/Ce-substituted **AB2**-type alloys by means of F-treatment.
Kitayama, Kohtarou; Komori, Dai; Liu, Fangjie; Uchida, Masaki; Suda,
Seijirau (Kogakuin Univ., Tokyo, 163-91, Japan). Kogakuin Daigaku
Kenkyu Hokoku, 78, 63-6 (Japanese) 1995. CODEN: KDKHAY. ISSN:
0368-5098. Publisher: Kogakuin Daigaku.

AB By the measurement of P-C-T (pressure-compn.-temp.) characteristics,
by the observation with metallurgical microscope and x-ray
diffraction anal., hydriding properties such as initial
activation and P-C-T isothermal and the surface
and bulk microstructures of $\text{Ti}_{0.5-x}\text{Zr}_{0.5-x/2}(\text{La/Ce})\text{Mn}_{0.8}\text{Cr}_{0.8}\text{Ni}_{0.4}(x=0.05)$ were studied and compared with

those of non-La/Ce-substitution alloys. It was found that the addn. of La/Ce to the alloys improved an initial activity characters and the fluorination treatment further improved the character. The **hydrogen absorption** by La/Ce-substitution was also discussed.

CC 66-3 (Surface Chemistry and Colloids)

Section cross-reference(s): 56

ST **hydrogen absorption** chromium manganese nickel alloy

IT **Absorption**

(**hydrogen absorption** mechanism of La/Ce-substituted **AB2**-type alloys by means of F-treatment)

IT 1333-74-0, **Hydrogen**, processes

(**hydrogen absorption** mechanism of La/Ce-substituted **AB2**-type alloys by means of F-treatment)

IT 174177-76-5

(**hydrogen absorption** mechanism of La/Ce-substituted **AB2**-type alloys by means of F-treatment)

IT 7782-41-4, Fluorine, reactions

(**hydrogen absorption** mechanism of La/Ce-substituted **AB2**-type alloys by means of F-treatment)

L70 ANSWER 20 OF 23 HCA COPYRIGHT 2004 ACS on STN

124:150854 Effects of Ni-substitution and F-treatment on the hydriding behaviors and microstructures of **AB2**-compound

(Ti,Zr)(Mn,Cr)₂. Liu, F.-J.; Suda, S.; Sandrock, G. (Kogakuin University, Department of Chemical Engineering, Chemical Energy Laboratory, 2665-1, Nakano-machi, Hachioji-shi, Tokyo, 192, Japan). Journal of Alloys and Compounds, 232(1-2), 232-7 (English) 1996. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier.

AB The effects of Ni-content and F-treatment of **AB2** compds.

Ti_{0.5}Zr_{0.5}(Mn_{0.5}Cr_{0.5})₂-xNi_x (x = 0.0 to about 1.4) on the initial **activation** characteristics, P-C-T property, and microstructure have been investigated. It was found that Ni can substitute into this **AB2** family of compds. which have the essentially single C14 Laves structure between x = 0.0 and about 1.0 Ni and become the C15 Laves structure between x = 1.0 and about 1.4 Ni. All the compns. were easily activated at 40.degree. and 1.0 MPa H₂ pressure. This family of compds. exhibited high **hydrogen storage** capacity and low hysteresis. The plateau pressures could be raised over two orders of magnitude by the increase of Ni-content. The F-treatment, which has been successfully used on **AB5** compds., such as LaNi_{4.7}Al_{0.3}, did not show beneficial effects on this **AB2** family of compds.

- CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
- ST **hydrogen absorption** titanium zirconium manganese
chromium; fluoride treatment Laves alloy hydriding behavior
- IT 1333-74-0, Hydrogen, processes 7782-41-4, Fluorine, processes
(effects of Ni-substitution and F-treatment on the hydriding
behaviors and microstructures of titanium-zirconium-manganese-
chromium **AB2**-compd.)
- IT 161468-06-0 166892-44-0 166892-45-1 166892-46-2 166892-47-3
166892-48-4 173866-16-5 173866-17-6
(effects of Ni-substitution and F-treatment on the hydriding
behaviors and microstructures of titanium-zirconium-manganese-
chromium **AB2**-compd.)
- L70 ANSWER 21 OF 23 HCA COPYRIGHT 2004 ACS on STN
- 121:113262 Optimization of composition and structure of metal-hydride
electrodes. Petrov, Konstantin; Rostami, Abbas A.; Visintin,
Arnaldo; Srinivasan, Supramaniam (Cent. Electrochem. Systems
Hydrogen Res., Texas A and M Univ. System, College Station, TX,
77843-3402, USA). Journal of the Electrochemical Society, 141(7),
1747-50 (English) 1994. CODEN: JESOAN. ISSN: 0013-4651.
- AB This paper focuses on investigations to improve the capacity and
cycle life of a Ni/metal hydride (MHx) battery by optimization of
the compn. (i.e., active material and additive) and structure of the
metal hydride electrode. Teflonized carbons, Vulcan-XC-72,
Norit-NK, and acetylene black (XC-35) were evaluated as
additive materials for the **AB2**- and **AB5**-type
alloys. Expts. were conducted to det. the optimum (a) amt. of
hydride material in the electrode, (b) ratio of the amt. of hydride
material to that of electronically conducting material (**C**
or acetylene **black**), and (c) percentage of
Teflon in the metal hydride electrode. The discharge capacity and
cycle life depended on both the type and amt. of the additive
material. The teflonized C additive increased the stability of the
electrode over that of an electrode with Cu powder as the additive.
The increase in stability and cycle life is attributed to the
flexible, electronically conducting three-dimensional C-Teflon
network which permits its intimate and stable contact with the
active alloy particles. The additive Vulcan-XC-72 enhances the
capacity of the electrode above that of an electrode with acetylene
black or Cu. The behavior of the electrodes, in respect to the
effect of the additive, was similar with the **AB2** and
AB5 alloys as active materials.
- IT 7440-44-0, Carbon, uses
(anodes contg., metal hydride, compn. and structure of,
optimization of, for nickel batteries)
- RN 7440-44-0 HCA
- CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

IT **Carbon black**, uses
(anodes contg., metal hydride, compn. and structure of,
optimization of, for nickel batteries)

IT Anodes
(battery, **hydrogen-absorbing** nickel-based
alloys, compn. and structure of, optimization of)

IT **7440-44-0**, Carbon, uses
(anodes contg., metal hydride, compn. and structure of,
optimization of, for nickel batteries)

IT 156912-23-1 156912-24-2
(**hydrogen-absorbing**, anodes, compn. and
structure of, optimization of, for nickel batteries)

L70 ANSWER 22 OF 23 HCA COPYRIGHT 2004 ACS on STN

118:216587 **Hydrogen-absorbing** alloy anodes and their
manufacture. Moriwaki, Yoshio; Yamamura, Koji; Tsuji, Yoichiro;
Fujiwara, Shozo; Iwaki, Tsutomu (Matsushita Electric Industrial Co.,
Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 05013075 A2 19930122
Heisei, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP
1991-162655 19910703.

AB The anodes comprise a mixt. of powd. **H-absorbing**
alloys of predetd. particle size bonded by short, elec. conductive
fibers and a polymer binder applied on porous conductive substrates.
The alloy particles are preferably Zr or Ni **AB2**-type
Laves-phase alloys having av. diam. $\leq 40 \mu\text{m}$ mixed with
metal or carbon fibers; the binder is selected from poly(vinyl
alc.), thermoplastic elastomers, CMC, and fluoropolymer and is
optionally used with a hydrophilic powder having av. particle diam.
 $\leq 10 \mu\text{m}$. The anodes are manufd. by kneading the mixt. with
a solvent, applying the paste on the substrates, and drying. These
anodes have high strength and render batteries with good high-rate
charging and discharging performance and long cycle life.

IT **7440-44-0P**
(carbon fibers, elec. conductor, in **hydrogen-**
absorbing anode manuf., for batteries)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IC ICM H01M004-24

- ICS H01M004-26
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
- ST battery **hydrogen absorbing** alloy anode; binder
hydrogen absorbing alloy anode; conductive fiber
hydrogen absorbing anode
- IT Fluoropolymers
• (binders contg., in **hydrogen-absorbing** anode
manuf., for batteries)
- IT Carbon fibers, uses
Metallic fibers
(elec. conductor, in **hydrogen-absorbing** anode
manuf., for batteries)
- IT Anodes
(battery, **hydrogen-absorbing** alloy, manuf.
of, binder and elec. conductive fibers in)
- IT 9002-89-5, Poly(vinyl alcohol) 9004-32-4, CMC
(binders contg., in **hydrogen-absorbing** anode
manuf., for batteries)
- IT 7440-44-0P
(carbon fibers, elec. conductor, in **hydrogen-**
absorbing anode manuf., for batteries)
- IT 147301-31-3P
(**hydrogen-absorbing**, anodes, binders and
conductive fibers in manuf. of, for batteries)
- IT 7440-02-0P, Nickel, uses
(powd., **hydrogen-absorbing** alloy anodes
contg., manuf. of, for batteries)
- L70 ANSWER 23 OF 23 HCA COPYRIGHT 2004 ACS on STN
- 102:121945 **AB5**-catalyzed hydrogen evolution cathodes. Hall,
D. E.; Shepard, V. R., Jr. (Res. Cent., Inco Alloy Prod., Suffern,
NY, 10901, USA). International Journal of Hydrogen Energy, 9(12),
1005-9 (English) 1984. CODEN: IJHEDX. ISSN: 0360-3199.
- AB The **AB5** metal compds. (e.g. $\text{LaNi}_4.7\text{Al}_{0.3}$) are highly
efficient H evolution electrocatalysts in alk. electrolytes. Three
types of **AB5**-catalyzed cathode structures were made, using
the hydride-forming **AB5** compds. in particulate form.
Plastic-bonded cathodes contg. >90 wt. % **AB5** (finished-wt.
basis) were the most efficient, giving H evolution overpotentials
(η_{H_2}) of 0.05 V at 200 mA/cm². However, they tended to swell
and shed material during electrolysis. Pressed, sintered cathodes
contg. 40-70 wt. % catalyst in a Ni binder gave η_{H_2} .apprx. 0.08
V; catalyst retention was excellent. Porous, sintered cathode
coatings were made with 30-70 wt. % **AB5** catalyst loadings.
Their overpotentials were similar to those of the pressed, sintered
cathodes. However, at catalyst loadings .ltorsim.40 wt. %, high
overpotentials characteristic of the Ni binder were obsd. The

structural and electrochem. properties of the 3 **AB5**
-catalyzed cathodes are discussed.

CC 72-2 (Electrochemistry)

IT **Carbon black**, uses and miscellaneous
(lanthanum intermetallic compd. electrocatalyst contg., for
hydrogen evolution)

IT **Absorption**
(of **hydrogen**, by lanthanum intermetallic compds.,
pressure in relation to)

IT 51312-66-4 60241-02-3
(**absorption** by, of **hydrogen**, pressure in
relation to)